UNDERGRADUATE BULLETIN

SANTA CLARA UNIVERSITY

1993-94

Santa Clara University reserves the right to make program, regulation, and fee changes at any time without prior notice. The University strives to assure the accuracy of the information in this bulletin at the time of publication. However, certain statements contained in this bulletin may change or need correction.

Nondiscrimination Policy

Santa Clara University does not discriminate on the basis of race, color, national and/or ethnic origin, sex, marital status, sexual orientation, handicap/disability, religion, veteran's status, or age in the administration of any of its educational policies, admissions policies, scholarship and loan programs, athletics, and other school-administered policies and programs, as well as employment-related policies and activities.

Inquiries regarding equal opportunity policies, the filing of grievances, or requests for a copy of the grievance procedures covering discrimination and harassment complaints, including complaints under

- Section 504 of the Rehabilitation Act of 1973 and 34 CFR 104 et seq. (pertaining to handicap/disability);
- Title VI of the Civil Rights Act of 1964 and 34 CFR 100 et seq. (pertaining to race, color and national origin);
- Title VII of the Civil Rights Act of 1964 and 29 CFR 1601 et seq. (pertaining to discrimination in employment on the basis of race, color, religion, sex, and national origin); and
- Title IX of the 1972 Education Amendments and 34 CFR 106 et seq. (pertaining to sex)
- Title I of the Americans with Disabilities Act of 1990

should be directed to Director
Affirmative Action Office
SCU Title IX Compliance Officer
Walsh Administration Bldg.
408-554-4113

Copies of these policies and procedures are also available from Human Resource Management (408-554-4392).

SANTA CLARA UNIVERSITY

Undergraduate Courses and Degrees 1993–94 Bulletin

Santa Clara, California 95053

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Academic Calendar 1993–94

FALL QUARTER 1993

May 3–28	Monday–Friday	Registration period, fall 1993
September 18–21	Saturday–Tuesday	New-student orientation
September 21	Tuesday	New-student registration/add period
September 22	Wednesday	Classes begin
September 22–28	Wednesday–Tuesday	Late registration/add period
September 28	Tuesday	Last day to declare P/NP grading option
October 15	Friday	Last day to submit incomplete spring quarter and summer session 1993 work to professors
October 22	Friday	Last day to petition for degrees to be conferred in December 1993
October 22	Friday	Last day to withdraw from classes without a W grade
October 22	Friday	Last day to remove spring quarter 1993 incompletes (faculty)
November 15–19	Monday–Friday	Winter registration period
November 24	Wednesday	Academic holiday
November 25, 26	Thursday, Friday	Thanksgiving recess; academic and administrative holidays
November 29	Monday	Last day to withdraw from classes
December 3	Friday	Classes end
December 6–10	Monday–Friday	Fall quarter examinations
December 15	Wednesday	Fall quarter grades due (faculty)
December 23, 24	Thursday, Friday	Christmas recess; administrative holidays
December 30, 31	Thursday, Friday	New Year's recess; administrative holidays

WINTER QUARTER 1994

November 15–19	Monday–Friday	Winter registration period
January 2	Sunday	New-student orientation/ registration
January 3	Monday	Classes begin
January 3–7	Monday–Friday	Late registration/add period

January 7	Friday	Last day to declare P/NP grading option
January 17	Monday	Martin Luther King Day; academic and administrative holiday
January 21	Friday	Last day to submit incomplete fall quarter 1993 work to professors
January 21	Friday	Last day to petition for degrees to be conferred in March 1994
January 28	Friday	Last day to remove fall quarter 1993 incompletes (faculty)
January 28	Friday	Last day to withdraw from classes without a W grade
February 14–18	Monday–Friday	Spring registration period
February 18	Friday	Last day to petition for degrees to be conferred in June 1994
February 21	Monday	Presidents' Day; academic and administrative holiday
March 4	Friday	Last day to withdraw from classes
March 11	Friday	Classes end
March 14–18	Monday–Friday	Winter quarter examinations
March 23	Wednesday	Winter quarter grades due (faculty)

SPRING QUARTER 1994

February 14–18	Monday–Friday	Spring registration period
March 27	Sunday	New-student orientation/ registration
March 28	Monday	Classes begin
March 28–31	Monday–Thursday	Late registration/add period
March 31	Thursday	Last day to declare P/NP grading option
April 1	Friday	Good Friday; academic and administrative holiday
April 15	Friday	Last day to submit incomplete winter quarter 1994 work to professors
April 22	Friday	Last day to petition for degrees to be conferred in August 1994

April 22	Friday	Last day to remove winter quarter 1994 incompletes (faculty)
April 22	Friday	Last day to withdraw from classes without a W grade
May 2–27	Monday–Friday	Fall 1994 registration period
May 27	Friday	Last day to withdraw from classes
May 30	Monday	Memorial Day; academic and administrative holiday
June 3	Friday	Classes end
June 6–9	Monday–Thursday	Spring quarter examinations
June 11	Saturday	143rd Commencement
June 14	Tuesday	Spring quarter grades due (faculty)

SUMMER SESSION 1994*

Session I

April 18–June 1	Monday–Wednesday	Summer advance registration period
June 2–15	Thursday–Wednesday	Walk-in registration
June 16	Thursday	Classes begin
June 16–20	Thursday–Monday	Late registration/add period
June 30	Thursday	Last day to withdraw from classes without a W grade
July 4	Monday	Independence Day; academic and administrative holiday; Monday classes meet on Friday, July 1
July 15	Friday	Last day to withdraw from classes
July 20	Wednesday	Classes end
July 21–22	Thursday–Friday	Summer Session I examinations

Session II

April 18–June 1	Monday–Wednesday	Summer advance registration period
June 2–15	Thursday–Wednesday	Walk-in registration
June 16–July 27	Thursday–Wednesday	Late registration/add period
July 25	Monday	Classes begin
July 29	Friday	Last day to withdraw from classes without a W grade

*Some classes follow different schedules than those indicated above. See summer class schedule for details.

August 19	Friday	Last day to withdraw from classes
August 26	Friday	Classes end
August 29–30	Monday–Tuesday	Summer Session II examinations

All dates are inclusive.

1

Santa Clara University

STATEMENT OF PURPOSE

Inspired by the love of God to serve through education, begun by the Franciscans who founded Mission Santa Clara in 1777 and continued by the Jesuits who opened the College in 1851, Santa Clara University declares its purpose to be the education of the human person within the Catholic and Jesuit tradition.

The University is thus dedicated to

- a community of highly qualified scholars, teachers, students, and administrators bound to an uncompromising standard of academic excellence;
- an education that, in its emphasis on undergraduate studies and its pursuit of selected high-quality graduate and professional programs, stresses moral as well as intellectual values, an education of the whole person, an education seeking to answer not only "what is" but "what should be";
- an academic community informed by Catholic principles, a community offering its members the opportunity for worship and for deepening their religious perception, yet a community enriched by men and women of diverse religious and philosophical as well as social and racial backgrounds, a community opposed to narrow indoctrination or proselytizing, a community wherein freedom of inquiry and freedom of expression enjoy the highest priority;
- an integrated curriculum designed not only to provide the scientific and humanistic knowledge necessary to enable students to become fully human, but also to demonstrate the unity of all forms of knowledge and to enable students to assume leadership in the modern world;
- the encouragement of teaching excellence and of the scholarly research that promotes such excellence, of close student-teacher relationships, of experimental and innovative courses and teaching methods—courses and methods that stimulate not only the acquisition of knowledge but also the creative use of knowledge;
- an academic community in which students, teachers, and administrators dedicated to academic freedom and united in the search for truth actively formulate and carry into effect the University's policies.

Board of Trustees
Santa Clara University
Jan. 22, 1975

HISTORICAL PERSPECTIVE

On Jan. 12, 1777, six months after the signing of the Declaration of Independence, a cross was planted at a site in the present city of Santa Clara by a Spanish Franciscan missionary, Tomás de la Peña, to mark the founding of the eighth of California's original 21 missions, Santa Clara de Asís.

Three-quarters of a century elapsed before Santa Clara University, or Santa Clara College as it was known, opened its doors as an institution of higher learning. In the intervening years, however, the mission served as a spiritual center and school for the Indians. Besides religious instruction, the men were taught stock-raising, farming, and the building trades; the women, weaving and sewing; the boys, reading, music, and religious drama. From 1777 until Mexican government secularization on Feb. 27, 1837, some 9,000 persons were baptized at the mission.

During the early period, the less solidly built mission buildings of the first and second sites were destroyed by the flooding waters of the Rio Guadalupe. The third mission church, constructed of adobe, was completed in 1784 but was seriously damaged by earthquakes in 1812 and 1818. A fourth church, also adobe, was used temporarily from 1819 to 1825. The larger, fifth adobe mission, with its quadrangle patio, was completed and dedicated Aug. 12, 1825. The University's Adobe Lodge Faculty Club is all that remains of the west wing of that quadrangle.

The first site of Mission Santa Clara is marked by a California state historical landmark located near the intersection of Kifer Road and De La Cruz Boulevard. Crosses mark the second site at De La Cruz Boulevard and Martin Street and the third site at Campbell and Franklin streets. The temporary fourth mission church stood between what are now Kenna Hall and the Walsh Administration Building.

During the first three decades of the 19th century, the old mission enjoyed its most fruitful years. In 1827, more than 1,400 Indians lived within sound of the mission's bells. In that year, some 15,000 sheep, 14,500 head of cattle, and abundant crops of wheat, corn, and beans were produced and cared for by the Indians under the guidance of the missionaries.

A combination of factors terminated the decades of prosperity at Santa Clara and the other California missions. The Mexican War of Independence brought turmoil from 1810 to 1821 and resulted in a decrease in Franciscan personnel and donations-in-aid from benefactors. The new Mexican government took possession of the old Jesuit Pious Fund of the Californias that had been the main source of support for the mission. Most of the Indians' lands, cattle, and sheep became the object of spoliation by civil administrators.

In 1827 and again in 1829, governmental decrees ordered exile for all Spaniards who refused allegiance to the new regime. Since most of the mission padres were from Spain, many chose banishment. Some, however, remained until 1833, when Mexican Franciscan replacements arrived from the missionary college of Zacatecas. Among them was Fray Francisco García Diego y Moreno, who was to become the first bishop of the Californias. Although committed to the welfare of the Indians, the padres' resistance to governmental encroachment on the Indians' rights and property had little effect. Full secularization of mission prop-

erties was finally imposed at Mission Santa Clara in early 1837. This action ended the effectiveness of the Franciscan missionary endeavor in Alta California. Within a few years, most of the mission buildings and the Indian lands, cattle, and sheep were seized by civil officials and other claimants. In the early 1840s, foreigners began arriving in Alta California in increasing numbers. Some of the immigrants were Anglo-Americans attracted by the rich agricultural lands of the Santa Clara Valley.

Events during 1848 dramatically altered the course of history at Santa Clara. In February the United States and Mexico signed the Treaty of Guadalupe Hidalgo, which concluded the two-year war in which they had been engaged and ceded California to the United States. That same year gold was discovered in the Sierra Nevada, thus attracting a flood of newcomers into the former Mexican province.

It was in this setting that Santa Clara opened its classroom doors in May 1851. The new bishop of San Francisco, Joseph Sadoc Alemany, asked Jesuits Michael Accolti and John Nobili, formerly Oregon missionaries, to open a college at Mission Santa Clara. During its first academic year, 1851–52, Father Nobili and a handful of Jesuit and lay teachers offered instruction in a variety of subjects to approximately 40 students. A decision made in 1854 by the Jesuit Province of Turin, Italy, to adopt California as a permanent mission field marked a turning point in Santa Clara's history. As a consequence, the Jesuits of Turin provided the college with the faculty and support that it needed to grow. The following year, Santa Clara College received a charter of incorporation from the state of California.* In 1857, the college conferred its first collegiate degree, a Bachelor of Arts diploma, on Thomas I. Bergin. This was the first diploma granted by any institution of higher learning in the state of California. By 1858, new scientific apparatus arrived from Paris, and integrated courses in science as well as in the classics and in commercial subjects were offered.

Slow and steady growth followed, and distinguished graduates became prominent members of California life. It was not until 1912, however, that the Schools of Law and Engineering were founded. In that same year, courses in the humanities and the sciences were expanded, and the college became Santa Clara University. Meeting the demands of urban growth in the Santa Clara Valley, courses in commerce and finance were also expanded in 1926, and the University's School of Business and Administration began. In that same year, the old mission church was destroyed by fire. The present structure, an enlarged replica of the original, was completed in 1928.

From the 1930s through World War II, the University's enrollment was relatively stable. The return of many veterans resulted in an enlarged student body and new resources. In 1947, for the first time in the University's history, enrollment broke the 1,000 mark. From the postwar period to the present, the face of the campus has been changing and expanding. In 1961, the University announced

*THE UNIVERSITY'S LEGAL NAME is *The President and Board of Trustees of Santa Clara College* to which should be added, *A Corporation, located at Santa Clara, California.* For the information of individual, corporation, and foundation donors who wish the tax benefits of their gifts and grants, the University is classified by the Internal Revenue Service as a 501 (c) (3) (ii) tax-exempt organization and it is not classified as a private foundation under section 509 (a) of the IRS Code.

a major change in policy and accepted women as undergraduate students for the first time in its 110-year history. Santa Clara became the first Catholic coeducational institution of higher learning in California. Thanks to the generous support of many friends, 23 new buildings have been added to match the growth in enrollments. The Louis B. Mayer Theatre, Leavey Activities Center, and Cowell Health Center were completed in the early 1970s. Additions in the 1980s included a computer center, engineering and computer laboratories, parking facilities, and student housing. The already scenic campus was significantly enhanced in 1989 by rerouting The Alameda, California's oldest north-south highway, around the University. With the new entrance road and landscaping, the reroute unifies the Mission and modern sections of the campus into 104 contiguous acres.

Although the student body has grown rapidly in the past decade, it has been held relatively small: 4,000 undergraduates and 3,800 graduate and law students. Since 1960, educational opportunities at all levels have increased.

As an independent University supported by tuition and gifts, Santa Clara has been able to accomplish change in ways that reflect its traditional concern for the individual student.

Today, Santa Clara University, the first institution to offer classes in higher learning on the West Coast, continues its mission heritage of service by helping its students equip themselves with advanced knowledge and humanistic values. Academic excellence in a well-balanced human being is the University's goal.

CAMPUS LOCATION

Santa Clara University is 46 miles from San Francisco, near the southern tip of the Bay, in an area rich in opportunities for learning. The campus is situated in the midst of one of the nation's great concentrations of high-technology industry (Silicon Valley) and professional and scientific activity. Many nearby firms and social agencies are world leaders in the search for solutions to humanity's most critical problems. The cultural and entertainment centers of San Francisco, Berkeley, Oakland, and Marin County are within one-hour's travel by bus, train, or car. In the opposite direction, the Pacific beaches of Santa Cruz are about 30 minutes away; the world-famous Monterey Peninsula and Carmel are two hours away.

The University is accessible by major airlines via San Jose International Airport, which is three miles from campus, and San Francisco and Oakland International airports.

Santa Clara has a moderate Mediterranean climate. During a 67-year period, the average maximum temperature was 71.4 degrees and the average minimum, 41.6 degrees. The sun shines an average of 293 days per year, and the average annual rainfall is about 15 inches.

ACADEMIC ORGANIZATION

The University is organized into five academic units.

The College of Arts and Sciences comprises 18 departments and offers 29 majors leading to either the Bachelor of Arts or the Bachelor of Science degree. The

College also provides the liberal arts curriculum to all undergraduate students in the University.

The Thomas and Dorothy Leavey School of Business and Administration offers a professional education in both undergraduate and graduate programs. The Learning Center for Organizations, an integral part of the school, offers nondegree seminars, lectures, and programs for professional managers and executives. The graduate programs are described in *Leavey School of Business and Administration Graduate Programs.*

The School of Engineering offers a technical education in both undergraduate and graduate programs. The graduate programs are described in *School of Engineering Graduate Programs.*

The School of Law offers a full range of courses in federal, state, and international law that leads to the J.D. degree. The *School of Law Bulletin* describes its programs.

The Division of Counseling Psychology and Education offers programs in various areas of counseling and education. *Division of Counseling Psychology and Education Graduate Programs* describes its programs.

ACADEMIC TERMS

The academic year (September to June) is divided into three 11-week terms. The 11th week is devoted to examinations. Most undergraduate courses in the College of Arts and Sciences and the Leavey School of Business and Administration carry 4 or 5 units of academic credit and students typically enroll in four courses per quarter. During some quarters of their junior and senior years, students may enroll in three courses. In the School of Engineering, course values range from 3 to 5 units each; consequently, the number of courses taken varies. Most classes are scheduled on Monday, Wednesday, and Friday with 65 minutes per class period or Tuesday and Thursday with 105-minute class meetings. Science and engineering labs are scheduled in the afternoons and on Tuesday and Thursday mornings.

SUMMER SESSION

The summer session offers day and evening courses for college credit. Undergraduate courses are offered in a number of academic disciplines. No transcript is required for admission, but all applicants must be in good academic standing. High school students who have completed the 11th grade are encouraged to apply to the Young Scholars Program. They may enroll in freshman-level courses. Room and board are available on campus at reasonable rates.

Graduate courses are also offered in the Leavey School of Business and Administration, the School of Engineering, the School of Law, the Division of Counseling Psychology and Education, and the College of Arts and Sciences in the Department of Mathematics and the Department of Religious Studies. Course information may be obtained from the individual schools.

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Admissions

ADMISSION TO FRESHMAN STANDING

Criteria

The University makes selective decisions regarding applicants for admission based on the following criteria: first, high school record; second, scores on College Entrance Examination Board tests; third, school recommendations; fourth, personal factors such as extracurricular involvement, character, and leadership; fifth, relationship to the University.

Admission to freshman standing at Santa Clara depends on a continued high level of performance during the remainder of the applicant's senior year in high school and on receipt of a high school diploma. If a significant change occurs in academic work during this year, the Committee on Admissions will re-evaluate the acceptance in light of that change.

Recommended Courses

The following high school courses are recommended for a student applying for admission to the University as a freshman:

	Units		
Course	*Liberal Arts Majors*	*Business and Social Science Majors*	*Natural Science, Mathematics, and Engineering Majors*
Algebra	2	2	2
English	4	4	4
History	1	1	1
Foreign language (one)	3	3	3
Plane geometry	1	1	1
Laboratory science (upper division)	1	1	2*
Trigonometry		$^1/_2$	$^1/_2$
Elective**	4	$3^1/_2$	$2^1/_2$

*Physics and chemistry are recommended laboratory sciences for natural science and engineering majors.

**Elective courses must be in advanced foreign languages, mathematics, laboratory science, or other solid college-preparatory courses.

Campus Visits

The University encourages all candidates to visit the campus, preferably when school is in session, so they can tour the campus with a student guide. Although interviews are not required, a member of the admissions staff will be happy to meet with candidates. Appointments should be made in advance.

Admissions Procedure

Prospective freshman students should

1. file the application and service fee of $35 with the Admissions Office, Santa Clara University (application forms may be obtained from that office);
2. submit a recommendation from a high school counselor or teacher, evaluating scholastic ability and character, to the Admissions Office (recommendation form is provided with application);
3. request the high school to forward a sixth-semester transcript to the Admissions Office;
4. take the Scholastic Assessment Tests (SAT)* no later than January of the senior year and request that scores be sent to the University (for information on dates and places of this test, write to the College Board, ATP, 1947 Center Street, Berkeley, CA 94704, or Box 592, Princeton, NJ 08541);
5. make certain all the above are completed and the required materials are submitted to the Admissions Office by Feb. 1 (full consideration cannot be assured for applications received after that date); and
6. mail application materials directly to the Admissions Office.

Sixth-Semester Decision

Students may seek an admissions decision after the sixth semester. Transcripts reflecting six semesters of work and recommendation forms should be sent by the high school. The decision concerning admissions will be rendered beginning in December. If the Committee on Admissions requires additional academic information before reaching its final decision, the student will be so informed in a letter.

ADVANCED PLACEMENT

Santa Clara participates in the Advanced Placement program to grant recognition of college-level academic achievement prior to matriculation and to encourage students to pursue advanced studies in their areas of interest.

Credit or placement is determined on the recommendation of the appropriate department, which will review the student's scores and may also review the student's high school record, teacher evaluations, substantiation of independent studies, and transcripts from other colleges. Course credit is offered to students

*The SAT is preferred, but the American College Testing (ACT) exam is also accepted.

who qualify in subjects according to the schedule issued by the University registrar. Students will be notified of such credit on matriculation at Santa Clara.

The following chart indicates the subject examination, required scores, and Santa Clara credit granted in the Advanced Placement program.

ADVANCED PLACEMENT POLICY

Examination	*Score Required*	*Credit (qtr. units)*	*SCU Course Waived*
Art: History	4, 5	4.0	Departmental determination
Art: Studio drawing	4, 5	**	Departmental determination
Art: Studio general	4, 5	**	Departmental determination
Biology	5	5.0	Departmental determination
Chemistry	4, 5	5.0	Chemistry 5
Comparative government and politics	4, 5	4.0	Political Science 2
Computer science A	4, 5	4.0	COEN 4 or DISC 17 or Math 10
Computer science AB	3, 4	4.0	COEN 4 or DISC 17 or Math 10
	5	8.0 or 4.0	COEN 4 and 5, or DISC 17, or Math 10 and 61
Economics (macro)	4, 5	4.0	Economics 1
Economics (micro)	4, 5	4.0	Economics 2
English: Language and composition	4, 5	4.0	English 1
English: Literature and composition	4, 5	4.0	3rd English requirement for Arts and Sciences and Business students
European history	4, 5	4.0	History 13
French language	4, 5	4.0	French 21
French literature	4, 5	4.0	French 22
German language	4, 5	4.0	German 21
Latin: Catullus–Horace	4, 5	4.0	None
Latin: Vergil	4, 5	4.0	None
Math: Calculus AB	4, 5	8.0	Math 11 and 12
Math: Calculus BC	3	4.0	Math 11
	4, 5	12.0	Math 11, 12, and 13
Music: Listen/Literature	4, 5	4.0	Departmental determination
Music: Theory	4, 5	4.0	Departmental determination
Physics B	4, 5	4.0	Physics 20
Physics C: Mechanical	4, 5	5.0	Physics 4
Physics C: Electrical and magnetic	4, 5	**	Departmental determination
Psychology	4, 5	4.0	Psychology 11
Spanish language	4, 5	4.0	Spanish 21
Spanish literature	4, 5	4.0	Spanish 22

U.S. government and politics	4, 5	4.0	Political Science 1
U.S. history	4, 5	4.0	History 7, 8, or 9

** Department determines the unit credit to be awarded and/or the course waived.

ADMISSION TO ADVANCED STANDING (TRANSFERS)

Each year the University accepts a number of transfer students, principally at the sophomore and junior levels. Since applications exceed the number of students who can be accommodated, no specific statement can be made about the quality of work (GPA) that will enable a transfer applicant to be accepted. Only students in good standing at the last college attended will be considered. No student on academic or disciplinary probation or suspension will be considered for admission.

Ordinarily, no minimum number of units is required for transfer admission. However, students who were not accepted as freshmen cannot be considered until they have completed at least 45 quarter units or 30 semester units of transferable college work. In general, students' class standing is determined by the number of units applicable to their degree program.

The Scholastic Assessment Tests of the College Entrance Examination Board are required of transfer applicants who have completed less than 45 quarter units or 30 semester units of transferable work. A high school transcript and transcripts from all colleges and universities attended are required of all applicants.

Transfer students may apply for admission for fall, winter, and spring quarters. Deadlines for applications to those terms are fall, May 15; winter, Oct. 15; spring, Jan. 15.

Transfer Credit

Transfer credit is determined by the dean of the College or School following the student's acceptance and submission of registration deposit. No evaluation will be made before that time. The following general statements apply to transfer credit:

- Santa Clara University awards transfer credit to students who have completed, with a grade of C or better, courses taken at other accredited four-year universities and colleges. The academic levels of these courses must be essentially equivalent to those of similar courses offered at Santa Clara and typically exclude courses or credit gained from continuing education or from practica or internships (i.e., experiential learning).
- Courses from accredited two-year institutions are generally transferable if they are similar to courses listed in the Santa Clara University *Undergraduate Bulletin,* under the same conditions; and if (in California community colleges) they are designated as University of California transferable. A maximum of 90 quarter units (60 semester units) of academic work, passed with a grade of C or better, taken at a community (two-year) college may be accepted for transfer credit toward a degree at Santa Clara. Students admit-

ted to the School of Engineering may transfer a maximum of one-half of their degree requirements from other accredited two-year institutions.

- Work done at other institutions will not be used in calculating grade point averages or class rankings at Santa Clara.
- Technical or trade courses and courses from regionally unaccredited institutions, trade schools, and extension or correspondence programs do not transfer.
- Students who are already enrolled at Santa Clara University and who intend to take courses at other institutions while on academic leave are strongly urged to have these courses approved in advance by the chair of the major department and by the dean of their college. In this way, the selection of non-transferable courses can be avoided. Appropriate approval forms are available from the Student Records Office.

Recommended Courses

Students applying for transfer to Santa Clara enhance their chances for admission by completing as many of the core requirements (outlined under each undergraduate division in this bulletin) as possible before transferring. Preference will be given to students who have completed the following courses:

- College of Arts and Sciences: English composition (2 semesters or quarters); college-level mathematics (1 semester or quarter); natural science (1 semester or quarter)
- School of Business: English composition (2 semesters or quarters); calculus and analytic geometry (2 semesters or quarters); accounting (2 semesters or 3 quarters); microeconomics; macroeconomics
- School of Engineering: English composition (2 semesters or quarters); calculus (2 semesters or 3 quarters); chemistry (2 semesters or 3 quarters); physics (1 semester or 1 quarter)

ADMISSION OF FOREIGN-BORN STUDENTS

Foreign-born students must present a score in the Test of English as a Foreign Language (TOEFL), which is administered by the Educational Testing Service. The minimum acceptable TOEFL score is 550. Foreign-born students, both freshmen and advanced-standing applicants, must also take the Scholastic Assessment Tests of the College Entrance Examination Board. In order to be issued Immigration Form I-20, the applicant must be accepted as a full-time student working toward a degree.

ADMISSION OF PART-TIME STUDENTS

The University does not admit degree-seeking students on a part-time basis. Those who wish to take an individual course on a space-available basis should contact the Admissions Office for an application for nonmatriculants.

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Financial Information

EXPENSES: 1993–94

Application fee **$35.00**
This nonrefundable charge is to be sent with each application form.

Deposits

All new students or students applying for readmission **$200.00**
This amount is automatically credited to the student's account when paid and is not refundable.

Housing prepayment **$200.00**
The $200 deposit must accompany the housing contract. The deposit is refundable on a prorated basis according to the schedule stipulated in the Student Housing Contract.

Tuition and fees per quarter **$4,293.00**

Late payment fee **$50.00**

Incremental tuition (per course) **$92.00**
For students taking engineering courses

Part-time tuition

One (1) term course **$1,441.00**
Two (2) term courses (lower-division students) **$2,664.00**
Two (2) term courses (upper-division students) **$4,293.00**
Upper-division students enrolled for at least two (2) courses, regardless of the unit value of the courses, are considered full-time students for tuition purposes and will be charged full-time tuition.

Room and board per quarter **$1,973.00**
The amount stated above is for the 19-meal plan rate of $842 and the standard residence hall (two persons per room) rate of $1,131. Please note that any other housing or meal plan arrangement will result in a different rate than stated above. Charges during winter and spring recess are by arrangement with the director of Housing and Residence Life.

Residence Life Programming Fee ($5 per quarter) **$15.00**

Note: Tuition and room and board are due and payable in full no later than the announced financial clearance deadline.

Fees

Co-op administrative fee (in addition to tuition) **$250.00**
Fee for challenging a course (per course) **$50.00**
Audit fee (per course) **$250.00**
Late registration fee (during add/drop period) **$30.00**
All changes after add/drop period **$75.00**
Late submission of form fee (administrative forms, e.g., application for degrees, etc., per day; $50 maximum) **$2.00**
Fee for replacement of damaged identification **$5.00**
Fee for replacement of lost identification **$15.00**
Deferment service fee **$50.00**
Returned check fee **$10.00**
Studies Abroad application fee (nonrefundable) **$30.00**
Studies Abroad administrative fee (per semester) **$500.00**
Studies Abroad administrative fee (per year) **$800.00**
Academic transcript fee (per copy) **$3.00**
Academic transcript fee (rush process) **$8.00**
New-student orientation fee **$80.00**

Note: For graduate programs in Business and Administration, Religious Studies, Counseling Psychology and Education, Engineering, and Law and summer session tuition and fees, see announcements of the various graduate programs and summer sessions.

Mandatory Health Insurance All undergraduate students with 6 or more units and all international students are required to show proof of health insurance coverage to waive purchase of the University plan. Students who do not provide such proof will be assessed the annual fee.

Annual student health insurance fee **$354.00**
Annual international-student health insurance fee **$560.00**

Registration Cancellation Fee If a student, after registering, withdraws anytime prior to the first scheduled day of classes and before attending any classes, the full refund is subject to a $50 registration cancellation fee.

Art Courses A materials fee will be charged for art courses. The fee varies per course.

Biology Laboratory Courses A $45 fee will be charged for each lab course to cover the cost of supplies.

Chemistry Laboratory Courses Breakage costs will be charged at the completion of each course. A $45 fee for each lab course will be charged.

Communication Laboratory Courses A fee will be charged for communication laboratory courses. The fee varies per course.

Computer Science (Mathematics) Courses A $30 fee will be charged for each course that requires intensive computer use.

Music Courses A $20 fee will be charged for each course. The private lesson course fee is $300.

Physics Courses A $20 fee will be charged for each lab course.

Psychology Courses A $40 fee will be charged for each lab course.

Special Information A full-time student who drops courses after the last day to add classes will be considered full-time for the balance of that term for tuition purposes.

Part-time Students For tuition purposes, a part-time student is defined as a lower-division student taking fewer than three (3) term courses or an upper-division student taking fewer than two (2) courses, regardless of the unit value of the course. For financial aid purposes, 6 units is the minimum number of units to be considered enrolled at least half time.

Parking Permits Permits may be purchase daily between 8 a.m. and 5 p.m. at the Public Safety Office. Permit fees are $40 per year or $20 per quarter.

Damages Charges for loss or damage in residence halls, to other University property, and to special equipment will be billed directly to the student and parents on report of damage or loss.

PAYMENT PROCEDURES

Returning Students

The University requires payment in full of tuition and room and board by the announced financial clearance deadline. All payments are to be sent to the Office of Student Accounts, Santa Clara University, P.O. Box 44783, San Francisco, CA 94144–4783.

The University does not bill in advance for an academic quarter. Payment instructions regarding costs and payment deadlines will be mailed to the permanent address each quarter.

For the 1993–94 academic year, the financial clearance deadlines are as follows:

Fall quarter	Aug. 31, 1993
Winter quarter	Nov. 19, 1993
Spring quarter	Feb. 25, 1994

These dates are subject to change without prior notice.

Payment for all charges is due on or before the announced financial clearance (payment) deadline, even if no payment information was received. Inquiries regarding account payment information and account status should be directed to the Office of Student Accounts (408-554-4412). Registration will not be considered complete and may be canceled unless payment in full is received or a formal deferment of payment is obtained from the Office of Credit and Collection by this deadline.

Students who have unpaid accounts at the University or who defer payment without approval are subject to dismissal from the University and will not be issued academic transcripts or diplomas as long as such accounts are outstanding.

Incoming Freshmen and Transfer Students

The University requires payment in full of tuition and room and board on or before registration day. Prior to registration, payment instructions regarding costs and payment deadlines will be mailed to the permanent address.

MONTHLY PAYMENT PLANS

Many families prefer to pay academic expenses from monthly income rather than make large cash payments. Several payment plans are available to accommodate those needs. For more information, please contact the Office of Student Accounts.

Families who do not choose a monthly payment plan may either pay all charges by the financial clearance deadline or take advantage of one of several deferred payment plans administered by outside agencies. Families who plan to use one of these agencies should complete the details with the sponsoring agency at least six weeks prior to registration. The names and addresses of these agencies are available from the Office of Student Accounts.

GUARANTEED TUITION PLAN

The Guaranteed Tuition Plan is a payment plan whereby families may prepay up to four years of tuition. The University guarantees that the student's tuition will not increase during the prepaid period. Payment of the required prepaid tuition and mandatory fees may be made in the following ways:

1. Lump sum payment from the family's own resources
2. Prepaid loan from a commercial lender

REFUND OF TUITION

The date on which written notification of withdrawal is received at the Student Accounts Office will be the effective date on which any refund of tuition will be determined, not the last date of attendance by the student. This policy also applies to incremental tuition, special course fees, and lab fees. Written notification of withdrawal must be received prior to the first scheduled day of classes to qualify for a full tuition refund less a $50 registration cancellation fee. Written notification of withdrawal received on or after the first scheduled day of classes will result in a refund of tuition according to the following schedule:

Prior to the start of the quarter* 100%

*Less registration cancellation fee

During the first week of the quarter 75%
During the second week of the quarter 50%
During the third week of the quarter 25%
NO FURTHER REFUNDS AFTER THE THIRD WEEK

No refunds will be made because of curtailment of services brought about as a result of strikes, acts of God, civil insurrection, riots or threats thereof, or other causes beyond the control of the University. All fees, charges, and refund schedules in this bulletin are subject to change without prior notice.

REFUND OF ROOM AND BOARD

Students who reside in University residences for less than a full term will be assessed prorated room charges based on the schedule stipulated in the Student Housing Contract. Students who are evicted from, move from, or otherwise withdraw from University housing during an academic term and who have not been released from the contract will continue to be assessed room charges for the remaining portion of that term.

Refund of unused board will be prorated from the Monday following the date of meal ticket cancellation. Refunds cannot be processed until one month after the student's withdrawal.

FINANCIAL AID

Santa Clara University maintains a broadly based program of financial assistance for its students. Administered by the Financial Aid Office, this resource helps bridge the gap between the cost of education and what parents and students can reasonably contribute.

The financial need of each family is estimated from information supplied on the Free Application for Federal Student Aid (FAFSA) in combination with the College Scholarship Service (CSS) Financial Aid Form (FAF).

A financial assistance package is prepared for the student based on this estimate and subject to the amount of total aid dollars available and any adjustments made by the aid office. Depending on the student's eligibility, an aid package may include any combination of the following: scholarships, grants, loans, or part-time on-campus employment.

Financial help from the University and other sources should be viewed as supplementary to the efforts of the student and family. Santa Clara University believes that the maximum effort to assist students with college expenses rests with the family. Working together, families and the University can ensure that although the cost of a college education is high, it need not be prohibitive.

More complete information about the University's financial aid program is available in the Student Financial Services bulletin *Putting It Together.* Specific answers concerning information in the bulletin are available from the Financial Aid Office (408-554-4505).

Third-Child Family Grant

The University offers a special one-half tuition remission to families who have three dependent undergraduate students concurrently enrolled at Santa Clara. The program's conditions are

1. all three students must be concurrently enrolled as undergraduates;
2. all three students must be dependent on parents;
3. parents must apply for the program by submitting a letter requesting the Third-Child Family Grant and a copy of their latest federal income tax return showing all three students as dependents; and
4. all financial aid deadlines should be followed when applying.

Applications

Aid packages including any combination of scholarships, grants, loans, and on-campus employment may vary in dollar amount each year depending on the student's family financial circumstances. Packages are renewable annually provided the student fulfills the University's requirements and reapplies each year by the application priority deadlines indicated below. New undergraduate applicants with completed documents on file by Feb. 1 preceding September enrollment should be notified of their aid eligibility no later than June 1. Undergraduate renewal applicants must reapply by March 2 each year and will receive notification of their aid eligibility prior to fall registration.

To apply for financial aid consideration, a student must submit the following documents by the indicated dates:

1. **Submit required documents—all students**

   Financial Aid Form (FAF) or College Scholarship Service (CSS) version of the Student Aid Application for California (SAAC) ..... **Feb. 1**

2. **Submit supplementary documents (where applicable)**

   a. Financial aid transcripts—transfer students ..... **May 1**
   b. Immigration and Naturalization Service (INS) status document—eligible noncitizens ..... **May 1**
   c. Student's U.S. tax returns, if requested ..... **May 1**
   d. Parents' U.S. tax returns, if requested ..... **May 1**
   e. Verification documents, if requested ..... **May 1**

Qualifications

The selection of students to receive financial aid requires evidence of financial need. Once this criterion has been met, priority of consideration is given to applicants with the highest scholastic attainments. Students of exceptional academic merit should write to the director of the Honors Program.

Scholarship recipients are expected to maintain an overall grade point average of 3.0. All other aid recipients must maintain a GPA of 2.0. All financial aid

recipients must remain enrolled as full-time students (minimum of 12 quarter units) for each quarter in which aid is received and must make satisfactory progress toward a degree. Please refer to the Academic Standing section of this bulletin (Pages 269–271) for specific criteria on good standing and the Student Classification section (Page 251) for specific criteria on normal progress. Financial aid may be terminated at any time for serious infractions of the University's rules and regulations. As a general rule, graduate and professional students will receive consideration for financial aid after the undergraduate needs have been met. Ordinarily, financial aid is not available for noncitizens unless they are in the United States permanently and have made application for citizenship. It is the financial aid recipient's responsibility to notify the Financial Aid Office immediately of any changes in address, name, marital status, academic status, or family financial situation.

Eligibility for financial aid is for a maximum of 12 quarters. Request for an extension of this maximum must be addressed in writing to the Financial Aid Office.

All financial aid awarded will be distributed in equal installments to coincide with the number of academic periods in the year and will be placed as a credit on the student's account at the Student Accounts Office.

Loans

Because scholarships and grants are limited, many students applying for aid find it most advantageous to finance a portion of their education through a loan program. Among programs available to students are Perkins Loans, Stafford Loans, Supplemental Loans for Students, Parent Loans for Undergraduate Students (PLUS), and Family Ed Loans. Further information may be obtained by consulting the Student Financial Services bulletin *Putting It Together.*

Employment

The University maintains Career Services on campus to help students secure part-time work. Students who receive financial aid are expected to contribute as much as possible from their own resources to assist in meeting their costs at Santa Clara.

Tentative Financial Aid Deadlines for 1993–94 and 1994–95

Please consult the 1993–94 edition of *Putting It Together,* available from the Financial Aid Office.

	1993–94	1994–95
Winter quarter	Dec. 1, 1993	Dec. 1, 1994
New scholarship and grant consideration	Feb. 1, 1993	Feb. 1, 1994
Perkins Loans and Work-Study (nonrecipients)	Feb. 1, 1993	Feb. 1, 1994
Spring quarter	March 1, 1993	March 1, 1994

Cal Grants	March 2, 1993	March 2, 1994
Financial aid renewal	March 2, 1993	March 2, 1994
Pell Grants (apply as early as possible)	May 15, 1994	May 15, 1995

These deadlines are tentative and should be confirmed with the Financial Aid Office after October 1993.

Note: All Stafford Loan applications must be completed and in the Financial Aid Office no later than six weeks prior to a registration period. Applications received later than this date will be processed as time allows, normally after registration. Information on summer session aid will be available from the Financial Aid Office after *June 15.*

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University Curriculum

Santa Clara's education of "the whole person" requires a program of study that reflects breadth as well as depth, imparts a common body of knowledge to all students, develops the capacity for critical judgment and clear expression, and encourages a desire for lifelong learning.

The University Curriculum, approved by the Board of Trustees in 1981, establishes course requirements to meet the following seven educational goals:

1. An ability to write clearly and effectively and to read critically (Composition and Literature)
2. An understanding of the history of Western culture and the methods of inquiry characteristic of the humanities (Western Culture)
3. An understanding of another culture through the study of a foreign language (Foreign Language)
4. An understanding of human behavior and the methods of inquiry characteristic of the social sciences (Social Sciences)
5. An understanding of the natural world and the methods of inquiry characteristic of mathematics and the natural sciences (Mathematics and Natural Sciences)
6. An ability to make decisions based on ethical principles (Ethics)
7. An understanding of the religious dimensions of life (Religious Studies)

5

College of Arts and Sciences

Dean: Peter A. Facione
Associate Dean for Academic Policies and Summer Programs:
Philip Boo Riley (Religious Studies)
Associate Dean for Instruction and Evaluation: Joanne Gainen
Associate Dean for Fiscal Affairs and Planning:
Thomas E. Shanks, S.J. (Communication)
Director of Academic Advising: Charles T. Phipps, S.J. (English)

Office of the Dean: Ramos Hall (408-554-4455)

The goal of the College of Arts and Sciences is to create a learning community characterized by a spirit of inquiry, mutual respect, intellectual excitement, and a commitment to address the fundamental problems of society. In this way the College is the center of Santa Clara's Jesuit, liberal education.

With more than 1,000 courses in the humanities, arts, social sciences, and natural sciences, the College provides

- a common educational experience for all undergraduate students at Santa Clara through the University's core curriculum;
- majors in 30 subject areas; and
- opportunities for further study in a student's particular area of interest.

While all undergraduate students at the University explore the liberal arts and sciences through the University's core curriculum, those who select majors or minors in the College develop specialized knowledge and skills in an area of concentration that reflects their personal interests and talents. Students can expect the College's courses to challenge them in many ways: to develop open and critical thinking; to communicate effectively; to work with complex methods of inquiry; to understand diverse cultures and peoples; to appreciate the demands of principled ethical decision making.

The College confers the degrees of Bachelor of Arts in Art, Chemistry, Classics, Communication, English, French, German, History, Individual Studies, Italian, Liberal Studies (for elementary school teaching), Music, Philosophy, Religious Studies, Spanish, and Theatre and Dance.

It confers the degrees of Bachelor of Science in Anthropology, Biology, Chemistry, Combined Sciences, Computer Science (Mathematics), Economics, Engineering Physics, Individual Studies, Mathematics, Physics, Political Science, Psychology, and Sociology.

Students are encouraged to use elective courses to pursue particular interests

beyond their chosen major. In addition to selecting individual courses, students have the opportunity to organize their electives to pursue minors and emphases in 30 departments and interdisciplinary programs throughout the College.

BACHELOR OF ARTS

The program of study for the degree of Bachelor of Arts, which consists of a total of 175 quarter units, includes courses that fulfill the goals of the University Curriculum, the College of Arts and Sciences curriculum, and the student's departmental major curriculum.

For the Bachelor of Arts degree, students must fulfill the following requirements:

Composition and Literature

Three courses: (a) two courses in composition and rhetoric, normally, English 1 and 2; and (b) one course in writing or in literature that includes a writing component. Preferably, this course should be taken after completing 60 quarter units.

Western Culture

Three courses in one of the following sequences: (a) English 11, 12, and 13; (b) History 11, 12, and 13; (c) Philosophy 11, 12, and 13; (d) Art History 11, 12, and 13; or (e) the 11, 12, and 13 sequence jointly offered by the Music and Theatre and Dance departments. The three courses in Western Culture should normally be taken in sequence.

Foreign Language

Successful completion of the third course of the first-year sequence in a single classical or modern foreign language. Students who have successfully completed the fourth year of study in a single classical or modern foreign language during high school or who demonstrate an equivalent level of proficiency by passing a language proficiency examination are exempt from this requirement.

Social Sciences

One course from the following: Anthropology 2, 3, 4; Economics 1, 2; Political Science 1, 2, 25, 40; Psychology 10, 11; Sociology 1, 33.

Mathematics and Natural Sciences

Three courses: (a) one course in mathematics equivalent to, at least, college algebra; (b) one course in natural science; and (c) one additional course in either mathematics or natural science.

Ethics

One course in general or applied ethics from the offerings in the Department of Philosophy.

Religious Studies

Three religious studies courses: (a) two courses, normally taken during the freshman and sophomore years—one introductory level and one intermediate level; and (b) one advanced-level course taken after completing 88 quarter units. These courses are to be taken in sequence.

Fine Arts

One studio art or performance course.

Ethnic Studies and Women's Studies

One ethnic studies or women's studies course.

Major Requirements and Electives

Each student must select one from among the 16 Bachelor of Arts majors offered by the College. The requirements for each major are provided in the pages that follow. Depending on the requirements for a particular major, students will have a number of free elective courses they may use to pursue interests in particular areas.

BACHELOR OF SCIENCE

The program of study for the degree of Bachelor of Science, which consists of a total of 175 quarter units (197 quarter units for Engineering Physics), includes courses that fulfill the goals of the University Curriculum, the College of Arts and Sciences curriculum, and the student's major curriculum.

For the Bachelor of Science degree, students must fulfill the following requirements:

Composition and Literature

Three courses: (a) two courses in composition and rhetoric, normally English 1 and 2; and (b) one course in writing or in literature that includes a writing component. Preferably, this course should be taken after completing 60 quarter units.

Western Culture

Two courses in one of the following sequences: (a) English 11, 12, and 13; (b) History 11, 12, and 13; (c) Philosophy 11, 12, and 13; (d) Art History 11, 12, and 13; or (e) the 11, 12, and 13 sequence jointly offered by the Music and The-

atre and Dance departments. The two courses in Western Culture should normally be taken in sequence.

Foreign Language

Majors in Social Sciences Successful completion of the third course of the first-year sequence in a single classical or modern foreign language. Students who have successfully completed the fourth year of study in a single classical or modern foreign language during high school or who demonstrate an equivalent level of proficiency by passing a language proficiency examination are exempt from this requirement.

Majors in Mathematics and Natural Sciences Successful completion of the second course of the first-year sequence in a single classical or modern foreign language. Students who have successfully completed the third year of study in a single classical or modern foreign language during high school or who demonstrate an equivalent level of proficiency by passing a language proficiency examination are exempt from this requirement.

Social Sciences

One course *outside the major* from the following: Anthropology 2, 3, 4; Economics 1, 2; Political Science 1, 2, 25, 40; Psychology 10, 11; Sociology 1, 33.

Mathematics and Natural Sciences

Four courses: (a) a minimum of two courses in mathematics and (b) a minimum of two courses in natural sciences.

Ethics

One course in general or applied ethics from the offerings in the Department of Philosophy.

Religious Studies

Three religious studies courses: (a) two courses, normally taken during the freshman and sophomore years—one introductory level and one intermediate level; and (b) one advanced-level course taken after completing 88 quarter units. These courses are to be taken in sequence.

Ethnic Studies and Women's Studies

One ethnic studies or women's studies course.

Major Requirements and Electives

Each student must select one from among the 13 Bachelor of Science majors offered by the College. The requirements for each major are provided in the pages

that follow. Depending on the requirements for a particular major, students will have a number of free elective courses they may use to pursue interests in particular areas.

Academic Advising

All students in the College are encouraged to work closely with the faculty in determining their academic program. All students, particularly those with questions about choosing and/or changing a major, are encouraged also to consult with the director of advising for the College.

DEPARTMENT OF ANTHROPOLOGY AND SOCIOLOGY

Professor: Witold Krassowski
Associate Professors: Alma M. Garcia, Charles H. Powers, George D. Westermark *(Chair)*
Assistant Professors: Luis Calero, S.J., Marilyn Fernandez, Mary Elaine Hegland, Kichiro K. Iwamoto, Russell K. Skowronek

The Anthropology and Sociology Department offers two distinct degree programs leading to the Bachelor of Science in Anthropology or the Bachelor of Science in Sociology. A solid undergraduate foundation in anthropology or sociology secures the analytical skills needed to undertake professional degree programs (in anthropology, sociology, law, and social services) or to embark on a number of careers (from management to research).

A minor in anthropology or sociology is available. Special emphasis programs also are available to interested majors.

REQUIREMENTS FOR ANTHROPOLOGY MAJOR AND MINOR

Anthropology majors must fulfill the general requirements of the University for the Bachelor of Science degree. In addition, they must complete the following requirements:

1. Anthropology 1 (Introduction to Physical Anthropology), 2 (Introduction to Archaeology), 3 (Introduction to Social and Cultural Anthropology)
2. Sociology 1 (Principles of Sociology) and Anthropology 50 (World Geography)
3. Anthropology 116 (Theory and Method) and 124 (Senior Thesis)
4. Six upper-division courses in anthropology, at least one of which must be a culture area course; Anthropology 198 (Internship) strongly recommended
5. Introductory statistics course (see adviser for recommendations)

The minor in anthropology requires completion of Anthropology 1 or 2; 3; one additional lower-division course; and four upper-division courses, including 116.

REQUIREMENTS FOR SOCIOLOGY MAJOR AND MINOR

Sociology majors must fulfill the general requirements of the University for the Bachelor of Science degree. In addition, they must complete the following:

1. Sociology 1 (Principles of Sociology) and 33 (Social Problems in America)
2. Anthropology 3 (Introduction to Social and Cultural Anthropology) and 50 (World Geography)
3. Sociology 116 (Methods of Social Research), 118 (Social Theory), and 124 (Senior Thesis)
4. Five other upper-division courses in sociology; Sociology 198 (Internship) strongly recommended
5. Introductory statistics course (see adviser for recommendations)

An average grade of C must be maintained in courses in the major. By the end of the winter quarter of their senior year, majors in both anthropology and sociology must complete a senior thesis approved by the faculty of the department.

The minor in sociology requires completion of Sociology 1, 33, 118, and three courses chosen from 125–199.

SPECIAL EMPHASIS PROGRAMS

Anthropology and sociology majors have the option of completing a special emphasis program to complete their majors. These programs are not narrow specializations, but reflect competence in the applied fields of the disciplines. The completion of special emphasis programs will be noted on student transcripts with the approval of the department chair. Detailed descriptions of the special emphasis programs can be obtained from the department secretary.

Anthropology Special Emphases

Archaeology Focuses on a deeper understanding of the human past and how it is studied. This is a possible course of study for majors with an interest in employment in cultural resource management or graduate study in archaeology.

Human Services Combines anthropology with the study of social problems and their alleviation. This is a possible course of study for majors planning careers in human resources, law, law enforcement, gerontology, or social work in a culturally diverse society.

Sociology Special Emphases

Business, Technology, and Society Links sociological principles and practices with management and administration of enterprises in the public and private sectors. This is a possible course of study for majors planning careers in business or public administration.

Human Services Combines sociology with the study of social problems and their alleviation. This is a possible course of study for majors planning careers in human resources, law, law enforcement, gerontology, or social work in a culturally diverse society.

ANTHROPOLOGY

1. Introduction to Physical Anthropology

Study of the origin and antiquity of man, the fossil evidence for human evolution, primate behavior, and human variation in morphology, serology, and genetics.

2. Introduction to Archaeology

Survey of the evolution of human culture during the prehistoric period in the Old World and the New World. Examination of the methods archaeologists use to study the past.

3. Introduction to Social and Cultural Anthropology

Concept of culture, the development and evolution of social and cultural analyses of the major subsystems of culture (economic, ethnological, social and political organizations, philosophy, and worldview), and selected issues of social concern; racism, cultural determinism, cultural relativity.

4. Vanished People and Lost Civilizations

Examination of "popular anthropology." Humans and their culture, human origins, and the development and understanding of human behavior. Evaluation of theories and assumptions in the popular literature in light of current anthropological knowledge.

50. World Geography

Provides an understanding of world geography through an appreciation of contemporary global problems. Problems include the environmental crisis, international relations, demographic trends, and economic development. Special emphasis on world hunger and the roots of Third World poverty. (Also listed as Political Science 50.)

51. Religion, Ritual, and Politics

Examination through case studies of the uses of religion and ritual in politics: in legitimizing the status quo, in political competition, and in organizing passive and active political resistance. How and why religion and ritual are used in political activity such as black history, the revolution in Iran, sexual politics, Communist and Catholic parties in Italy. Possible reasons for the current religious resurgence in the United States and elsewhere. (Also listed as Religious Studies 50.)

56. Anthropology of Religion

Relation of religion to culture, personality, and social organization. Theories on the functioning of myth, ritual, and symbolism. Religious leaders, interpretations of death and afterlife, traditional curing, and religious movements and cults. (Also listed as Religious Studies 56.)

86. Native-American Cultures[§]

Study of the range of variation in Native-American cultures. Examination of changes in recent history as well as contemporary issues.

88. Women in the Middle East[‡]

Examination through monographs, novels, and films of the situation and activities of Middle Eastern women in a variety of geographical and class settings. Women in economic and political process, family and kinship, wars of liberation and revolution. Women and gender symbolism as related to politics, development, social change, and religious resurgence.

90. Cross-cultural Study of Women[‡§]

Cross-cultural examination of the roles and statuses of women and men. Exploration of factors affecting the lives of

[‡] Course included in Women's Studies program [§] Course included in Ethnic Studies program

women and men, such as public and domestic realms of activities, political and economic factors, and family and socialization practices. Comparisons of the situation of women and men in the United States to determine the origins and future of sex roles in our own society.

91. Lower-Division Seminar in Anthropology

Seminar for freshmen and sophomores on selected issues in anthropology. By permission of the instructor only. NCX†

116. Theory and Method in Anthropology

Logic of research procedures and the theoretical issues associated with anthropological practice. Skills and methods of designing and analyzing research explored in readings and exercises. History of anthropological thought. Required for majors and minors in anthropology. *Prerequisite: Anthropology 3 or permission of the instructor.* NCX†

118. Social Theory

In-depth treatment of innovations and developments in social thought. Emphasis on explaining what is essential about particular theoretical frameworks, how they can be used, and why they should be given attention.

124. Senior Thesis

Senior majors complete their theses under the guidance of faculty advisers and make seminar presentations of their work. NCX†

144. Cultural Ecology

Survey of the theories, methods, and applications of the ecological perspective to the cultural attributes of past and present human populations. Emphasis on the relationship between the natural environment and human cultural systems.

149. North American Prehistory

Survey of the prehistoric cultures of North America and Northern Mexico from earliest human occupation to European colonization.

150. Religion in Culture and Society

Cross-cultural examination of religions in a range of human societies. Emphasis on religious pluralism, religious movements, and secularism in the contemporary world. (Also listed as Religious Studies 162.)

151. Law and Conflict Resolution

Current issues in the anthropology of law and conflict resolution. Exploration of legal systems at various levels of societal complexity to understand the basis for social control in all human societies. Courts, legal professions, and politics from a cross-cultural perspective.

152. Political Anthropology

Cross-cultural examination of political behavior in a range of human societies and the effects of social, cultural, and environmental factors on political organization. Religion and politics, the role of women in politics, ethnic competition, secret societies, political ritual and ceremony, and the effects of colonialism and economic change. Special emphasis on the relationship between local communities and national governments.

153. Peasant Societies

Examination of the nature of peasant societies and the changes they are facing in Africa, Asia, and Latin America. Topics include land scarcity, poverty, urban migration, and political turmoil.

154. Islam in the Middle East

Examination of the variety of religious experiences, activities, and interpretations among Muslims and of the place of Islam in current social and political life such as

† Exempted from challenge

community organization, local-level politics, governments and political resistance, women's roles, and contact with the West. Discussion of the underlying reasons behind the recent resurgence of Islam and its effects on Muslim societies. (Also listed as Religious Studies 154.)

157. Family and Kinship‡

Ways in which kinship and family life can be organized. Causes and consequences of different family patterns. How families differ across cultures, over time, and among different groups in the United States.

158. Applied Anthropology

Application of anthropological knowledge to contemporary human problems. Topics range from the introduction of new crops in agricultural development to miscommunication in international business. Concerns of education, health, and volunteer services. Implications of ethical problems and theories of social change.

160. Urban Life

Cross-cultural examination of life in urban environments. Emphasis on how the city shapes various social institutions from the family to religious associations. Transition from rural to urban life in relation to such factors as economic change, migration, and ethnic affiliation.

165. Human Services

Examination of underlying social forces that create the need for a human welfare safety net in our society. Discussion of work and management issues in public and private nonprofit agencies that provide social services, with particular emphasis on how agencies and their staff balance agency goals, client needs, funding, and program evaluation. Consideration of human services in a multicultural context, with focus on culture-specific service needs and service provision. Exposure to a range of employment opportunities in the social services.

172. Anthropology of Aging

Cross-cultural examination of the aging process in a range of human societies. Emphasis on level of technology, degree of urbanization, rate of social change as well as social, political, and cultural differences in understanding how the elderly adapt to, and cope with, the modern world.

181. Pacific Island Societies

Examination of the societies of the three culture areas of the Pacific: Melanesia, Micronesia, and Polynesia. Comparison of traditional ecological adaptations, social organization, and belief systems. Colonialism, economic change, migration, and political independence.

185. Peoples of Latin America

Examines the diversity of Latin America, a continent of great physical, cultural, and socioeconomic contrasts; the mix of races and cultural traditions; human adaptation to the natural environment; economic and social inequalities; and the common heritage of Latin American peoples.

187. Native-American Cultures of the Pacific Coast§

Examination of the diversity of Native American cultures found along the West Coast of North America from California to Alaska. Use of archaeological, ethnographic, and historic information to compare/contrast economies, social organization, and belief systems in the past and present.

188. People, Culture, and Change in the Middle East

Examination of people's lives, social organization, and change in the Middle East through ethnographies, film, and novels.

† Exempted from challenge ‡ Course included in Women's Studies program
§ Course included in Ethnic Studies program

Emphasis on political culture, the fate of tribal peoples and peasants under modernizing nations, women in society and gender symbolism, contact with the West, Islam and religious resurgence, and revolution.

193. Advanced Seminar in Anthropology

Seminars for juniors and seniors on selected topics in anthropology. By permission of the instructor only. NCX†

196. Archaeological Method and Theory

Introduction to the techniques of discovery and analysis that archaeologists have found useful in research. Special attention to sampling techniques in survey and excavation. Classification techniques for measuring parameters of prehistoric demography, diet, craft specialization, and exchange.

197A, 197B. Field Course in Archaeological Method

Six weeks of on-site archaeological field research. Practical experience in the basic techniques of excavation and field analyses. By permission of the instructor only. NCX†

198. Internship

Opportunity for students in good standing to work and conduct anthropological analyses in community agencies, government bureaus, and political or industrial organizations. Must receive departmental approval prior to registration. NCX†

199. Directed Reading/Directed Research

Intensive reading in areas not emphasized by the department. Independent research on specific topics not fully covered in departmental courses. Written departmental approval necessary prior to registration. NCX†

SOCIOLOGY

1. Principles of Sociology

Introduction to the field of sociology. Emphasis on the major sociological perspectives and the basic elements of sociological analysis. Introductory exposure to research methodology.

33. Social Problems in the United States

Contemporary social problems and issues in U.S. society from a sociological perspective. Focus on the changing family, gender roles, poverty, racism, crime and violence, and international conflict.

51. Women and Men in the Workplace

Examination of the status and roles of men and women in the labor force. How gender differences are developed through socialization and some of the consequences of these differences: tokenism, sexual harassment, the "glass ceiling," and the dual-career family. Includes strategies and policy remedies for gender inequality in the workplace.

65. Crime and Delinquency

Broad survey of major issues surrounding the causes and nature of, and solutions to, the problem of crime and delinquency in the United States.

† Exempted from challenge

91. Lower-Division Seminar in Sociology

Seminar for freshmen and sophomores on selected issues in sociology. By permission of the instructor only. NCX†

116. Methods of Social Research

Introduction to the logic and strategies of social research, field studies, archival research, comparative analysis, and experimental design. Techniques of data analysis. Examination and critique of examples of each type of research from the social science literature. Students design their own research project. *Prerequisites: Sociology 1 and a statistics course, or permission of the instructor.* NCX†

118. Social Theory

In-depth treatment of developments in social thought. Emphasis on explaining what is essential about particular theoretical frameworks, how they can be used.

124. Senior Thesis

Collaborative research project conducted under the direction of a faculty member. NCX†

127. Small Groups

Structure and social processes that occur in small groups. Power and prestige, leadership, communication networks, game theory, and distributive justice.

129. Social Dimensions of Communication

Communication as a sociopsychological and cultural process. Examination of the nature, elements, and patterns of communication at the individual, interpersonal, small-group, and organizational levels.

132. Social Stratification§

Analysis of the principal lines of social cleavage within U.S. society. Emphasis on the racial, sexual, ethnic, occupational, and class divisions prevalent in the contemporary world.

133. Politics and Society in Third World Countries

Social and political change in the Third World. Relationship between economic and social development and the emergence of democratic, authoritarian, or revolutionary regimes in Africa, Asia, and Latin America. Emphasis on ways in which the international system influences development through investigation of theories of interdependence, dependency, and neo-imperialism.

134. Politics and Society in Mexico

Examination of the major social and political forces shaping contemporary Mexican society and culture. Emphasis on the relationship between social classes in Mexican society and the political development of the modern Mexican state. (Taught periodically as part of SCU's summer program in Mexico in conjunction with the National Autonomous University of Mexico.)

135. Women and Social Change in Latin America‡

Examination of the effects of social change and development policies on Latin American women. Emphasis on specific Latin American societies and forms of governments including peasant societies and capitalist, socialist, and revolutionary regimes.

136. Deviant Behavior

Examination of such deviant behavior as crime, mental disorder, and alcoholism. Social factors in the etiology and control of deviant behavior.

137. Social Change

Significant trends and issues in contemporary U.S. society and in the world. Utility

† Exempted from challenge ‡ Course included in Women's Studies program
§ Course included in Ethnic Studies program

of sociological concepts and principles in understanding contemporary society.

138. Population and Resources

Demographic issues in the modern world. Introduction to the study of population. Population measures, patterns of growth, and problems of quantity, quality, composition, distribution, and migration. Population policies: population, environment, natural resources, and the quality of life.

148. Complex Organizations

Examination of bureaucracy. Structural characteristics and consequences of living in a bureaucratic society. Examples drawn from industrial organizations, mental institutions, prisons, and universities.

149. Business, Technology, and Society

Examination of the interplay between business and society. Emphasis on (1) the ways in which demographic, technological, and value changes influence business opportunities; and (2) sociological strategies for organizing successful businesses in the 1990s.

150. Ethnic Enterprises[§]

Examination of the social, economic, and political factors relating to the establishment of ethnic enterprises and the roles of ethnic entrepreneurs in their communities.

153. Race, Class, and Gender in the United States[§‡]

Examination of the economic, social, political, and cultural experiences of minority women (Chicanas, African Americans, Asian Americans, and Native Americans) in the United States.

157. Family and Kinship[‡]

Ways in which kinship and family life can be organized. Causes and consequences of different family patterns. How families differ across cultures, over time, and among different groups in the United States.

162. Political Sociology

Analysis of power relations in the United States. Examination of different dimensions of power. Particular emphasis on the development of sociopolitical movements that challenge the political system.

163. Sociology of Work and Occupations

Ideological and institutional characteristics of modern industrial society and some of its basic problems, such as alienation, affluence and work motivation models, primary group influences, and leadership behavior.

164. Collective Behavior

Analytical study of collective behavior principles: typology of crowds, mass behavior, and the characteristics of publics. Introduction to social movements.

165. Human Services

Examination of underlying social forces that create the need for a human welfare safety net in our society. Discussion of work and management issues in public and private nonprofit agencies that provide social services, with particular emphasis on how agencies and their staff balance agency goals, client needs, funding, and program evaluation. Consideration of human services in a multicultural context, with focus on culture-specific service needs and service provision. Exposure to a range of employment opportunities in the social services.

166. Sociology of Crime

Relationship between crime and society. Discussion of theories of criminal behavior, white-collar crime, juvenile crime, women and crime, prisons, the death penalty, and the philosophy of punishment.

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‡ Course included in Women's Studies program § Course included in Ethnic Studies program

172. Sociology of Aging

Introduction to social gerontology. Theoretical approaches and research in social gerontology; the elderly—public attitudes, self-image, social bonds, living environments, public policies, programs, and major problem areas; death and dying.

175. Race and Inequality[§]

Analysis of the socioeconomic and political situation of African, Asian, Hispanic, and Native Americans in contemporary U.S. society. Topics include race and class, occupational and economic inequality, racial discrimination, the culture of poverty, cultural stereotyping, and resistance to change.

176. Elder Law

A survey of public policy issues particularly affecting the elderly. Consideration of the legal aspects of death and dying, involuntary commitment, guardianship and conservatorship, age discrimination, public benefit programs, and nursing homes.

177. Intercultural and International Communication

Communication in the "global village." Examination of the nature, characteristics, and structures of intercultural transactions using the sociopsychological and anthropological approaches. A framework for analysis of the theoretical and applied aspects of international communication with emphasis on the formal interactions between nations and their governments in the forms of diplomacy and propaganda.

193. Advanced Seminars in Sociology

Seminars for juniors and seniors on selected issues in sociology or current problems of social relevance. NCX[†]

198. Internship

Opportunity for students in good standing to work and conduct sociological analyses in community agencies, government bureaus, and political or industrial organizations. Must receive departmental approval prior to registration. NCX[†]

199. Directed Reading/Directed Research

Intensive reading in areas not emphasized by the department. Independent research on specific topics not fully covered in departmental courses. Written departmental approval necessary prior to registration. NCX[†]

[†] Exempted from challenge [§] Course included in Ethnic Studies program

DEPARTMENT OF ART

Associate Professors: Brigid S. Barton, R. Kelly Detweiler *(Chair)*, Susan J. Felter, Samuel R. Hernandez
Assistant Professor: Eric C. Apfelstadt
Senior Lecturer: Gerald P. Sullivan, S.J.
Lecturer: Kathleen Maxwell

The Art Department offers major and minor programs in studio art and art history as well as elective or required courses for nonmajors.

REQUIREMENTS FOR MAJOR AND MINOR

Art majors may choose an emphasis in studio practice or art history as a preparation for careers in art or graduate studies directed toward teaching or research in art history, museum studies, or commercial and fine arts. In addition to completing the major requirements specified below, art majors must fulfill College and University Curriculum and Bachelor of Arts requirements.

Art majors should select a University Curriculum sequence outside the major from one of the following three areas:

1. English 11, 12, and 13 (Literature I, II, III)
2. History 11, 12, and 13 (Ancient, Medieval, Modern)
3. Philosophy 11, 12, and 13 (Classical & Medieval, Early Modern, Modern & Contemporary)
4. Music/Theatre and Dance 11, 12, and 13 (Performance and Culture I, II, III)

Students who have studied abroad may apply no more than one-half of their art courses (studio art or art history) at an overseas institution for credit toward the major or minor in art at Santa Clara University. Students who wish to receive credit toward a major or minor in art for courses from other institutions must, in any case, undergo a review by members of the Art Department faculty. Students must be able to document work completed at other institutions, whether in the United States or abroad.

Seminars are strongly recommended for majors in either their junior or senior year: 198 (Art History Seminar) for students emphasizing art history and 196 (Studio Art Seminar) for students emphasizing studio art. A student emphasizing studio art may take 196 (Studio Art Seminar) as a replacement for one of the two required upper-division art history courses for the major. A student emphasizing art history may take 198 (Art History Seminar) as a replacement for one of the two required upper-division studio courses for the major.

Proper credentials will admit a student to the art building after closing time and on weekends. A lab fee may be exacted for all studio courses to help defray the cost of materials.

Studio Art Emphasis

The following lower-division courses are required in the freshman and sophomore years:

1. Art 10 (Introduction to Studio Art) or another lower-division studio course with permission of instructor
2. One course from Art 15 through 57
3. One course from Art 63 (Basic Ceramics) or 64 (Basic Sculpture)
4. Two courses from Art History 11, 12, and 13 (Western Culture: Art History I, II, and III)
5. Six upper-division studio courses and one upper-division art history and Art 196 or two upper-division art history courses

Students emphasizing studio art are also required to exhibit their work in the Freightdoor Gallery during spring quarter of their senior year.

Art History Emphasis

The following lower-division courses are required in the freshman and sophomore years:

1. Art 10 (Introduction to Studio Art) and one additional lower-division studio art course *or* one course from Art 15–57 and one course from Art 63 (Basic Ceramics) or Art 64 (Basic Sculpture)
2. Art History 11, 12, and 13 (Western Culture: Art History I, II, and III)
3. Six upper-division art history courses and one upper-division studio course and Art 198 (Art History Seminar) or two upper-division studio courses

Minor in Art

The Studio Art minor requires one course chosen from Art 10 or 15–57; either Art 63 or 64; one course from Art 11, 12, or 13; three courses from Art 101–164; and one course from Art 170–189.

The Art History minor requires two courses selected from Art 11, 12, or 13; one studio course from Art 10–64; three courses from Art 170–189; and one studio course from Art 101–64.

STUDIO ART

10. Introduction to Studio Art

Introduction to fundamental principles and techniques of two-and three-dimensional art. Concepts such as color, composition, and light and the reductive, manipulative, and additive methods of sculpture. Studio course.

15. Basic Photography

Introduction to photography as an art form. Includes basic camera vision and technique, as well as black-and-white darkroom work. Assignments attempt to stimulate visual awareness and individual creativity. Camera with manual shutter speeds and aperture capabilities required. Studio course.

33. Basic Drawing

Introduction to various drawing media and techniques as well as the problems of self-expression involved in traditional and contemporary drawing. Studio course.

43. Basic Painting

Introduction to the basic skills and concepts requisite for self-expression in painting media. Emphasis on color and composition. Studio course.

46. Basic Watercolor

Introduction to techniques and materials of watercolor painting. Studio course.

53. Basic Printmaking

Introduction to the basic printmaking techniques as an art form. Linoleum block, wood block, and mono printing. Studio course.

57. Basic Etching

Introduction to intaglio printing techniques on metal plates through a process of drawing and etching with acids. Studio course.

63. Basic Ceramics

Introduction to three-dimensional problems, materials, and techniques. Handbuilding, mold-making, glazing, and firing. Studio course.

64. Basic Sculpture

Introduction to the fundamentals of art in a three-dimensional form, including materials and techniques and the problems of expression peculiar to sculpture. Studio course.

97. Special Projects

For lower-division students who want to do an art project not covered in the catalog. Under the direction of a member of the Art Department faculty. Group meetings with the teacher to discuss progress. May be repeated for credit. Open to majors; nonmajors with permission of instructor.

101. Photography

Black-and-white photography beyond the basic level. Emphasis on the exploration of individual abilities and expression. Includes collage, hand coloring, artificial lighting, portraiture, and independent projects suitable for each student. Also includes some study/discussion of photography as it relates to contemporary fine art theory and practice. *Prerequisite: some previous experience in black-and-white darkroom work.* May be repeated for credit.

131. Life Drawing

Drawing from the model stressing composition, anatomy, and creative drawing. Studio course. *Prerequisite: Art 33 or permission of instructor.* May be repeated for credit.

136. Graphic Design

Exploration of the materials and techniques of graphic design through practical projects including advertisement layout, cover design, trademarks, poster design, and stationery and letterhead design. Analysis of the principles and elements of design and color, line, value, proportion, unity, and composition.

143. Painting

Further study of various styles, techniques, and media in painting. Studio course. May be repeated for credit.

146. Watercolor

Further study of the techniques and materials of watercolor painting. Studio course. May be repeated for credit.

153. Printmaking

Continuation and extension of Art 53. Printmaking techniques are refined and elaborated. Studio course.

157. Etching

Continuation of Art 57. May be repeated for credit.

163. Ceramics

Advanced ceramics procedures. Slip casting, throwing on the wheel, combinations of various materials. May be repeated for credit.

164. Sculpture

Continuation of Art 64. May be repeated for credit.

193. Computer Design Workshop

An interdisciplinary workshop for engineering, art, and communication students. Graphics computers and software. Students work in teams to explore solutions to important social problems, use the computer to illustrate solutions, and complete formal presentations of their findings. Limited enrollment. *Prerequisite: permission of instructor.* (Also listed as Comm 193 and MECH 193.)

194. Computer Art

Use of friendly computers to draw imagery directly and to manipulate photographic imagery. Emphasis on artistic exploration and the development of individual abilities and interests. *Prerequisite:*

any other Art Department studio course. May be repeated for credit.

196. Studio Art Seminar

Recommended for all junior and senior studio art majors. Preparation for graduation and the rigors of graduate school or professional job solicitation. How to prepare a portfolio, the basis for all job and graduate school applications. Resume preparation, artwork preparation for exhibition, and photography of artwork. Students are expected to exhibit their work in the art gallery during spring quarter. Although highly recommended, this course does not count as one of the six upper-division courses required for the studio art major. However, it does count as a replacement for one of the two upper-division art history courses required of the major with an emphasis in studio art.

197. Special Projects

For advanced students who want to do an art project not covered by the courses in the catalog. Under the direction of a member of the Art Department faculty. Group meetings to discuss progress with one another and with the teacher. May be repeated for credit. Open to majors; nonmajors with permission of instructor.

199. Directed Research/Creative Project

Tutorial work in studio art or art history. By permission of the chair of the Art Department and the instructor.

ART HISTORY

11. Western Culture: Art History I

Survey of art and architecture of the ancient and medieval worlds. Interdisciplinary emphasis. With Art History II and III, this lecture course constitutes a University Curriculum sequence, but can be taken separately.

12. Western Culture: Art History II

Survey of the painting, sculpture, and architecture of the period from the Renaissance through the Baroque. Interdisciplinary emphasis. With Art History I and III, this lecture course constitutes a University Curriculum sequence, but can be taken separately.

13. Western Culture: Art History III

Survey of painting, sculpture, and architecture from the 18th century to the present. Interdisciplinary emphasis. With Art History I and II, this lecture course constitutes a University Curriculum sequence, but can be taken separately.

97. Special Projects

For lower-division students who want to do an art project not covered in the catalog. Under the direction of a member of the Art Department faculty. Group meetings with the teacher to discuss progress. May be repeated for credit. Open to majors; nonmajors with permission of instructor.

170. Ancient Art

A survey of Greek and Roman art from the fifth century B.C. through the early fourth century A.D. Covers classical and Hellenistic production in the Greek world and Roman art of the Empire through Constantine. Lecture course. (Also listed as Classics 188.)

173. Early Christian and Byzantine Art

A survey of Christian art and architecture in the Western and Eastern Roman Empire. Painting, sculpture, architecture, and

mosaics of Rome and Ravenna are studied in the first part of the course. Byzantine art of the sixth through the 13th century is addressed in all media. Lecture course.

174. Western Medieval Art

A survey of the art and architecture of Western Europe from the eighth through the 13th century, focusing on one or more of the following periods of artistic production: Carolingian, Ottonian, Romanesque, and Gothic. Investigation of issues and problems associated with courtly life, monasticism, and pilgrimage. Lecture course.

175. Early Renaissance Art

Painting, sculpture, and architecture in Italy from the late 13th to the late 15th century. Emphasis on the foundations and first flowering of the Renaissance style in its cultural context, with particular attention to Florence and Siena. Lecture course.

176. High Renaissance and Mannerist Art

Painting, sculpture, and architecture in Italy in the 16th century. Emphasis on the mature elaboration and manipulation of the Renaissance style, with particular attention to Florence, Rome, and Venice. Lecture course.

177. Northern Art in the Renaissance Period

The visual arts in Northern Europe from the late 14th through the 16th century, with particular attention to Flanders, Germany, and France. Lecture course.

178. Baroque Art

Painting, sculpture, and architecture throughout Europe from the late 16th through the early 18th century. Particular emphasis on Italy, Spain, Flanders, Holland, and France. Lecture course.

181. American Art

Rise and development of an American expression in the arts. Study of examples of American painting, sculpture, and architecture with a view toward arriving at a broadened understanding of the forces that shaped the specific American point of view in the visual arts. Lecture course.

183. 19th-Century Art: 1780–1880

Neoclassicism, Romanticism, and Realism in the context of 19th-century culture in Europe and America. Survey of painting, sculpture, and architecture in this period. Lecture course.

184. Early Modern Art

Analysis of Post-Impressionism, Cubism, Expressionism, Surrealism, and other important early modernist movements. Painting, sculpture, and architecture relative to major historical trends up to World War II. Lecture course.

185. Contemporary Art: 1940–1980s

Survey of contemporary developments in the arts from the events leading up to Abstract Expressionism to the present, including photography, performance, and the more traditional arts of painting, sculpture, and architecture. Lecture course with field trips.

188. History of Modern Architecture

Survey of Western architecture. Evolution of modern buildings from roots in the 19th century to Post-Modernism. In-depth study of major monuments and significant architects. Lecture course.

189. History of Women Artists ‡

An attempt to balance the customary approaches in the history of art with an overview of the contributions of women artists to the ongoing historical development of Western visual productions. Lecture course.

‡ Course included in Women's Studies program

190. Museum Studies

Practicum in the varied aspects of museum work. Field trips and guest lecturers from Bay Area museums. By permission of the instructor.

197. Special Projects

For advanced students who want to do an art project not covered by the courses in the catalog. Under the direction of a member of the Art Department faculty. Group meetings to discuss progress with one another and with the teacher. May be repeated for credit. Open to majors; nonmajors with permission of instructor.

198. Art History Seminar

Highly recommended for junior and senior art history majors and minors. Origins of the discipline and its current methodologies. Techniques for more effective research, writing, and oral presentation via selected topics. Practical issues involved in the transition from college to art history–related careers. Although highly recommended, this course does not count as one of the six upper-division courses required for the art history major. However, it does count as a replacement for one of the two upper-division studio courses required of a major with an art history emphasis.

199. Directed Research/Creative Project

Tutorial work in studio art or art history. By permission of the chair of the Art Department and the instructor.

DEPARTMENT OF BIOLOGY

Professor Emeritus: Thomas N. Fast
Professors: William R. Eisinger *(Chair),* Francis R. Flaim, John S. Mooring, Geraldine A. Tomlinson
Associate Professors: James L. Grainger, David L. Tauck
Assistant Professors: Carolyn G. Bellinger-Kawahara, Roberta E. Berlani, Janice Edgerly-Rooks, Andrew D. Thompson Jr.
Scientist-in-Residence: Harold P. Klein

The Department of Biology offers a program leading to the Bachelor of Science degree. Most courses emphasize laboratory work. In addition, the faculty encourage students to assist them in their own research. The major provides students a broad background in biology that serves as a strong foundation for graduate, medical, or professional studies as well as for careers in teaching, research, or business. The department also offers courses of general interest to all University students who are curious about the nature of living things. A minor in biology is also available.

REQUIREMENTS FOR MAJOR

In addition to completing the University Curriculum and College requirements for the Bachelor of Science degree, students majoring in biology must complete the following departmental requirements:

1. Two biology courses chosen from courses 1–89 (usually taken during the fall and winter quarters of the freshman year)

2. Biology core series: Biology 91 (Populations), 92 (Physiology), and 93 (Cells)
3. A minimum of seven upper-division biology courses, at least five of which must have a laboratory
   a. At least one upper-division course in each of the following categories: plant, animal, population, and cell. A single course may not be used to satisfy the requirement in more than one category. See departmental listings to determine which category (or categories) a particular course fulfills.
   b. A minimum 2.0 GPA for graduation
4. Chemistry 5, 6, 35, and 36
5. Physics 20, 21, and 22 (General Physics I, II, and III) or Physics 4, 5, and 6 (Physics for Scientists and Engineers I, II, and III). The General Physics series, previously numbered 106, 107, and 108, will fulfill this requirement for students who began their course work in 1991.
6. Mathematics 11 and 12. Math 9 is a suitable introduction to Math 11 for students preparing for calculus.

RECOMMENDATIONS FOR MAJOR

In addition to the courses in 1–6 above, the following courses may be required for admission to graduate or professional schools and, with 4 and 6 above, provide a more thorough foundation in mathematics and chemistry.

1. Chemistry 10 and 37
2. Mathematics 8 and 13
3. Upper-division chemistry courses, such as Chemistry 141 (Biochemistry I), Chemistry 150 (Physical Chemistry for the Life Sciences), or others

REQUIREMENTS FOR MINOR

The following two minors are offered:

Program I (for students interested in environmental biology) Two biology courses from 1–89; Biology 91 (Populations) and 92 (Physiology); Chemistry 5 and 6; three upper-division biology courses at least two of which have a laboratory. Suitable courses include 132 (Field Botany), 133 (Ecology of California Plant Communities), 156 (General Ecology), 165 (Animal Behavior), 167 (Ornithology), 173 (Evolution), and others with approval of instructor.

Program II (for students interested in biochemistry) One biology course from 1–89; Biology 91, 92, and 93 (Populations, Physiology, and Cells); Chemistry 5, 6, 35, and 36; three upper-division biology courses, at least two of which must have a laboratory. Any upper-division biology course for majors is suitable, as determined by the student in consultation with his/her adviser.

PREPARATION IN BIOLOGY FOR ADMISSION TO TEACHING CREDENTIAL PROGRAMS

The state of California requires that students seeking a credential to teach biology in California secondary schools either pass a subject-area examination in biology or complete the state-approved Subject-Matter Preparation Program in biology. The credential itself requires a fifth year of study and student teaching.

The Biology Department offers courses that satisfy the requirements for the state of California Subject-Matter Preparation Program in biology. The program is similar to the biology major, with some modifications. General requirements include courses in general biology, chemistry, organic chemistry, physics, and mathematics. In addition, students must take upper-division biology courses in genetics, physiology, development, microbiology, and field biology. Education 98/198B is a recommended elective.

Students interested in the Subject-Matter Preparation Program should consult the chair of the Biology Department at an early date.

RESEARCH OPPORTUNITIES

Students are encouraged to participate in original research as part of their undergraduate training. Most faculty involve students in their research; opportunities also exist at neighboring institutions. Course credit can be obtained for research work by enrolling in Biology 198.

DEPARTMENTAL LETTERS OF RECOMMENDATION

The department will provide departmental recommendations for students applying to medical schools, dental schools, graduate programs in health care fields, and other programs. To be eligible for a departmental recommendation, a student must have at least a 3.0 GPA in science courses (biology, chemistry, math, and physics) and have completed at least two upper-division biology courses. Requests for a departmental recommendation and all supporting materials must be received by the department by Oct. 15.

Students who do not meet the GPA or upper-division course requirement may file a petition and explain why a recommendation should be granted. Students who do not have a departmental recommendation may certainly obtain individual letters of recommendation from Biology Department faculty members.

LOWER-DIVISION COURSES

Note: For courses that charge fees, see the quarterly Class Schedule.

9. Human Biology

Introduction to basic cell biology, functional anatomy, and physiology, with focus on how each organ system contributes to homeostasis. Consideration of several pathological conditions as well as the scientific basis of selected current issues in health and disease.

43. Human Ecology

Examination of the relationship between humans and their environment. Resource

depletion, energy requirements, pollution, food production, and population problems.

44. Endangered Ecosystems

Examination of the scientific, social, political, economic, and ethical issues surrounding the preservation or exploitation of endangered ecosystems such as tropical rain forests, arctic tundra, wetlands, old-growth temperate-zone forests, and coral reefs. Includes field trips to local endangered ecosystems (e.g., San Francisco Bay, Point Reyes National Seashore).

75. Human Nutrition

Nature and roles of basic nutrients essential for maintaining human health. Application of the principles of nutrition through the life cycle. Role of disease and other nutritional topics of current interest.

80. Introduction to Marine Science

Biology of the marine environment. Survey of marine organisms and their adaptations to various habitats. Physical and chemical factors in oceanography. Marine ecology.

82. Principles of Human Heredity

Human genetics. Introduction to human reproductive physiology and embryology. Discussion of current techniques in reproductive and genetic manipulation and the social issues that they raise. Designed for majors at the lower-division level or any nonmajor.

85. Human Disease/Human Health

Examination of health and disease of the human organism. Topics include what constitutes health, natural defense mechanisms, the immune system and its role in disease prevention, major diseases and their causes, and community health. Designed for lower-division majors or nonmajors with little or no experience in science or mathematics.

91. Populations

Examination of ecology and animal diversity. Discussion of the origin of life and the evolution of the major groups of animals. Topics include natural selection, population biology, community ecology, and ecosystems. Laboratory 30 hours. Offered only in spring quarter. *Recommended: two biology courses numbered 1–89.*

92. Physiology

An introduction to common themes in plant and animal physiology. Emphasis on the individual organism. A discussion of control theory and biologic control systems. Exploration of the mechanisms of transport, gas exchange, and water balance in plants and animals, as well as plant diversity using specific examples of adaptations. Emphasis on the integration of physiologic functions as a means of maintaining homeostasis even under harsh environmental conditions. Laboratory 30 hours. Offered only in fall quarter. *Prerequisites: Chemistry 6 (may be taken concurrently) and two biology courses numbered 1–89. Recommended: Biology 91.*

93. Cells

An introduction to the cell and molecular fundamentals necessary for all life. The functional organization of the cell. Other topics include membrane structure and function, exchange of materials across membranes, metabolism and bioenergetics, the cell cycle, genetics, and molecular biology. Emphasis on the common molecular events involved in the maintenance of life. Laboratory 30 hours. Offered only in winter quarter. *Prerequisites: Chemistry 36 (may be taken concurrently) and Biology 92. Recommended: Biology 91 and two courses numbered 1–89.*

99. Special Topics

Investigation of a specific area or topic in the biological sciences. Open to majors and nonmajors.

UPPER-DIVISION COURSES

101. Vertebrate Anatomy

Comparative structure, organization, adaptation, classification. Laboratory 60 hours. *Prerequisites: Biology 91, 92, and 93 (or 20 and 22) or equivalent.*

107. Histology and Cytology

Cells, basic tissue types, structure, and histogenesis. Basic histological techniques. Laboratory 60 hours. *Prerequisites: Biology 91, 92, and 93 (or 20, 22, and 34) or equivalent.*

110. Genetics

Basic principles governing inheritance and gene expression in viruses, procaryotes, and eucaryotes. Emphasis on molecular aspects. Laboratory 30 hours. *Prerequisites: Biology 93 (or 34) and Chemistry 36.*

112. Pathogenic Microbiology

Study of disease-producing bacteria, rickettsiae, and fungi. Emphasis on specific and nonspecific host-defense mechanisms, identification, pathogenesis, epidemiology and control, and community health issues. No laboratory component. *Prerequisite: Biology 93 and Chemistry 36. Recommended: Biology 113.*

113. Microbiology

Characteristics of microorganisms: bacteria, fungi, viruses, rickettsiae. Emphasis on biochemical taxonomy and microbial physiology. Laboratory 60 hours. *Prerequisite: Biology 93 (or 34) or permission of instructor.*

114. Immunology

Principles, mechanisms, and techniques of humoral and cellular aspects of the immune response. Immediate and delayed hypersensitivity, tissue transplantation, tumor immunology, and immunodeficient states in humans. Laboratory 30 hours. *Prerequisite: Biology 93 (or 34) or permission of instructor.*

115. Animal Development

Experimental and anatomical analysis of vertebrate development. Emphasis on cellular and molecular mechanisms that control morphogenesis, differentiation, and growth. Laboratory 30 hours. *Prerequisite: Biology 93 (or 34). Recommended: Biology 110.*

124. Animal Physiology

Examination of the physical and chemical basis of animal life, focusing on the control mechanisms of selected major organ systems. Laboratory 30 hours; focuses on aspects of human physiology including several computer-assisted studies. *Prerequisite: Biology 93 (or 34).*

125. Plant Physiology

Physiological processes of plants. Emphasis on current research in the field. Laboratory 30 hours. *Prerequisite: Biology 93 (or 34).*

128. Plant Development

Study of plant development. Emphasis on the experimental approach and current research. Laboratory 30 hours. *Prerequisite: Biology 93 (or 34).*

130. Economic Botany

Critical analysis of plant food production potentials with special consideration of modern approaches to pest control and crop improvement including biotechnology. Required field trips. *Prerequisite: Biology 93 (or 34).* NCX†

132. Field Botany

Field study of vascular plants, especially the seed plants of California; their identi-

† Exempted from challenge

fication, distribution, and ecology. Laboratory 60 hours. *Prerequisite: Biology 91 (or 21) or equivalent.*

133. Ecology of California Plant Communities

California plant communities and the factors that determine their distribution. Laboratory and field work 30 hours. *Prerequisite: Biology 91 (or 21) or equivalent.*

145. Virology

Study of viruses: their structure and classification, experimental cultivation, quantitation, classes of viral replication, and viral pathogenesis and disease. No laboratory component. *Prerequisites: Biology 93 and Chemistry 36. Recommended: Chemistry 141.*

156. General Ecology

Quantitative study of the interrelationships of organisms with their biotic and abiotic environments. Emphasis on population dynamics, interspecific relationships, community structure, and ecosystem processes. Laboratory and field work 30 hours, including one weekend field trip. *Prerequisites: Biology 91 (or 33) and Math 7 or 11.*

165. Animal Behavior

Examination of the behavior of animals in nature using an organizational scheme that recognizes proximate, or immediate, causes of behavior and evolutionary bases for behavior. Topics include physiological correlates of behavior, perception of natural stimuli (light, sound, chemicals); and behavioral ecology of foraging, mating systems, parent-offspring relationships, and social behavior. Laboratory 30 hours. *Prerequisite: Biology 91 (or 33).*

167. Ornithology

Emphasis on the evolution, morphology, and behavior of birds. Required field trips. Laboratory 30 hours. *Prerequisite: Biology 91 (or 33).*

173. Evolution

Examination of the concepts and critical issues concerning organic evolution, including the origins and maintenance of biological diversity, punctuated equilibrium theory, sociobiology, and molecular evolution. *Prerequisites: Biology 91 (or 33) and 110, or permission of instructor.*

174. Cellular Biochemistry

Study of the function and assembly of cellular organelles and the signal pathways that control cellular proliferation. *Prerequisite: Biology 93 (or 34).*

175. Molecular Biology

An introduction to the concepts and practical methods used in the field of molecular biology. Lectures focus on critical reading and evaluation of original journal publications. Laboratory 60 hours. *Prerequisite: Biology 93 (or 34).*

187. Biology of Aging

Analysis of the human aging process. The biological, medical, social, and ethical issues associated with aging in America. Topics include theories of aging, cancer, osteoporosis, sexuality, health-care costs, and death. *Open to all students. Does not count toward a major or minor in biology.*

190A, B. Contemporary Issues in Biology

Specialized treatment of some aspect of biology of current interest to the biologist as well as to society in general. *Prerequisites will be specified according to topic.* NCX†

198. Internship and Undergraduate Research

Students wishing to take either 198A or 198B should have a GPA of 3.0 or better

† Exempted from challenge

in biology and must present an outline of their projected research to the chair not later than the fifth week of the term preceding the start of the project. (2–5 units)

198A. Internship

Research in off-campus laboratories under the direct guidance of cooperating research scientists and faculty advisers. Frequent meetings with on-campus advisers.

198B. Undergraduate Laboratory Research

Supervised laboratory research culminating in a written report suitable for publication. Sustained for one year with credit given for one term. *Prerequisite: departmental and University permission.* NCX†

199. Directed Reading and Research

Detailed investigation of a specific topic in biology under the close direction of a faculty member. Students wishing to take this course should have a GPA of 3.0 or better in biology and must present an outline of their projected research to the department chair not later than the fifth week of the term preceding the start of the project, which will continue for one term only. *Prerequisite: departmental and University permission.* NCX†

† Exempted from challenge

DEPARTMENT OF CHEMISTRY

Professors Emeriti: Joseph F. Deck, William F. Sheehan
Professor: Lawrence C. Nathan *(Chair)*
Associate Professors: Robert J. Pfeiffer, Lois C. Rosenthal, Michael A. Sweeney, W. Atom Yee
Assistant Professors: Linda S. Brunauer, Brian J. McNelis, Amy M. Shachter
Lecturer: Steven L. Fedder
Clare Boothe Luce Professor: Amy M. Shachter

The Department of Chemistry offers three baccalaureate degrees. The Bachelor of Science in Chemistry program prepares students for further work in chemistry, either in graduate school or as professional chemists. This program is approved and certified by the American Chemical Society. The Bachelor of Science with a Major in Chemistry prepares students for a career in medicine, dentistry, law, chemical engineering, business, teaching, or related fields. The Bachelor of Arts in Chemistry also prepares students for a variety of careers, but in the context of a liberal arts program with chemistry at its core. Each of these specialties requires different supporting courses. Suggested curricula have been prepared by the department. A minor in chemistry is also available.

REQUIREMENTS FOR MAJOR AND MINOR

Students majoring in chemistry must complete the University Curriculum and College requirements for the Bachelor of Science or the Bachelor of Arts. In addition to these general requirements, the specific departmental programs for each degree are presented below.

Bachelor of Arts in Chemistry

This four-year course of study allows students the most freedom in choosing electives, especially in areas other than science. It is designed for students with a strong interest in the liberal arts. It is also an excellent program for pre-medical students.

1. Chemistry
   a. Lower-division core: Chemistry 5, 6, 9, 10, 35, 36, 37
   b. Upper-division core: Chemistry 111, 151, 152
   c. Two additional upper-division chemistry electives
   d. Research methods: Chemistry 181 and 1 unit of Chemistry 182
2. Supporting courses
   a. Mathematics 11, 12, 13 (Calculus and Analytic Geometry I, II, and III)
   b. Physics 4, 5, 6 (Physics for Scientists and Engineers I, II, and III); or Physics 20, 21, 22 (General Physics I, II, and III)

Bachelor of Science with a Major in Chemistry

This four-year program provides a liberal scientific degree suitable for those planning careers associated with chemistry, including health-related sciences, environmental or patent law, business, and others. Several specialized tracks are possible within this program.

1. Chemistry
   a. Lower-division core: Chemistry 5, 6, 9, 10, 35, 36, 37
   b. Upper-division core: Chemistry 111, 120, 151, 152
   c. Four additional upper-division courses as follows depending on the desired emphasis:
      i. Standard program
         (1) Three from Chemistry 101, 112, 130, 141, 142, 153
         (2) One from Chemistry 191, 192, or a fourth course from the preceding list
      ii. Biochemistry/organic emphasis
         (1) Chemistry 130, 141, 142/143
         (2) One from Chemistry 191, 192; or one from Biology 110, 114, 115, 174, 175
      iii. Physical/inorganic/analytical emphasis
         (1) Chemistry 101, 112, 153
         (2) One from Chemistry 130, 191, 192, or Physics 116
   d. Research methods: Chemistry 181 and 1 unit of 182
2. Supporting courses
   a. Mathematics 11, 12, 13 (Calculus and Analytic Geometry I, II, and III)
   b. Physics 4, 5, 6 (Physics for Scientists and Engineers I, II, and III); or Physics 20, 21, 22 (General Physics I, II, and III)

Bachelor of Science in Chemistry (Certified)

This four-year curriculum provides graduates with the background necessary to begin a career in chemistry at industrial and governmental laboratories or for admission to institutions offering advanced degrees in chemistry. The American Chemical Society certifies that this degree meets all its recommended professional standards for chemists.

1. Chemistry
   a. Lower-division core: Chemistry 5, 6, 9, 10, 35, 36, 37
   b. Upper-division core: Chemistry 101, 111, 112, 120, 130, 141, 151, 152, 153
   c. Research methods: Chemistry 181, 3 units of 182, oral presentation, and written thesis
2. Supporting Courses
   a. Mathematics 11, 12, 13 (Calculus and Analytic Geometry I, II, and III); (Mathematics 21 [Calculus and Analtytic Geometry IV] recommended)
   b. Physics 4, 5, 6 (Physics for Scientists and Engineers I, II, and III)

A certified degree with a biochemistry emphasis is also available. The biochemistry requirements are the same as the certified, with two exceptions: Chemistry 153 is replaced by Chemistry 142 and 143, and three biology courses are required: Biology 91 (Populations), 92 (Physiology), and 93 (Cells).

Minor in Chemistry

The minor in chemistry requires completion of Chemistry 5, 6, 10, 35, 36, and 37 and three upper-division courses, including one in physical chemistry (150 or 151) and one with a laboratory (101, 130, 151, or the combination of Chemistry 142 and 143). Chemistry 120 may not be used as one of the three upper-division courses.

SUBJECT-MATTER PREPARATION PROGRAM

The state of California requires that persons seeking a credential to teach chemistry and other physical sciences in California secondary schools, besides completing a fifth year of studies and student teaching, either pass a state-approved examination in physical sciences or complete the state-approved Subject-Matter Preparation Program in the physical sciences. The program requires the same courses as the chemistry major (standard B.S. or ACS-certified B.S. degree) and successful completion of Physics 3 (Introduction to Astronomy) and 51 (Introduction to Earth Science). Education 98/198B is a recommended elective.

For further details, consult Dr. Steven L. Fedder in the Chemistry Department at an early date.

LOWER-DIVISION COURSES

Note: A laboratory fee is required for each laboratory course. In addition, breakage charges will be assessed after each course has been completed.

1. Chemistry and the Environment

Basic chemical concepts related to environmental issues such as global warming, acid rain, ozone depletion, waste and resource management. For the nonscience student. (4 units) NCX†

2. Chemistry in the Modern World

Various applications of chemistry in today's world. Possible course offerings include Chemistry in Modern Society, Chemistry in the Natural World, Chemistry and the Health Sciences, Chemical Origins of Life, Understanding Hazardous Materials, Geochemistry, and perhaps others that may be offered occasionally. For the nonscience student. (4 units) NCX†

5. General Chemistry I

Atomic structure. Periodic properties and the periodic table. Nomenclature. Chemical bonding. Molecular structure. Chemical equations and stoichiometric relationships. Properties of gases, liquids, and solids. Oxidation and reduction. Laboratory 3 hrs/wk. *Prerequisites: high school chemistry, physics, algebra, geometry, and trigonometry.* (5 units) NCX†

6. General Chemistry II

Solutions. Chemical thermodynamics. Chemical kinetics. Equilibrium. Acids and bases. Ionic equilibria. Electrochemistry. Selected topics in descriptive and applied chemistry. Laboratory 3 hrs/wk. *Prerequisite: Chemistry 5.* (5 units) NCX†

9. Inorganic Chemistry

Detailed description of the chemical properties of the representative metals, transition metals, nonmetals, and noble gases. Crystal structure. Introduction to the chemical literature. Laboratory 3 hrs/wk. *Prerequisite: Chemistry 6.* (4 units) NCX†

10. Quantitative Analysis

Introduction to the theories and practice of acid-base, oxidation-reduction, precipitation, potentiometric, and spectrophotometric analyses. Laboratory 4 hrs/wk. *Prerequisite: Chemistry 6.* (5 units) NCX†

30. Environmental Applications in Organic Chemistry

A broad overview of organic chemistry with special emphasis on environmental applications, including ozone depletion, ground water pollution, petroleum resources, and pesticide use. Viewed on a foundation of the naming, properties, and reactivity of families of organic compounds. For nonmajors who do not plan to take additional organic chemistry courses. Laboratory 3 hrs/wk. *Prerequisite: Chemistry 5 or permission of instructor.* (5 units) NCX†

35. Organic Chemistry I

Basic concepts of bonding and structure in organic compounds, stereochemistry. Nomenclature. Physical and chemical properties of alkanes, alkenes, alkynes, and alkyl halides. Introduction to reaction mechanisms. Laboratory 3 hrs/wk. *Prerequisite: Chemistry 6.* (5 units) NCX†

36. Organic Chemistry II

Details of nucleophilic substitution and elimination reactions. Spectroscopic methods of structure determination. Nature and reactions of aromatic compounds and other conjugated pi systems. Chemistry of ethers, epoxides, and alcohols. Laboratory 3 hrs/wk. *Prerequisite: Chemistry 35.* (5 units) NCX†

† Exempted from challenge

37. Organic Chemistry III

Aldehyde, ketone, amine, phenol, and carboxylic acid chemistry. Carbonyl condensation reactions. Carbohydrate, protein, and synthetic polymer chemistry. Special topics. Laboratory 3 hrs/wk. *Prerequisite: Chemistry 36.* (5 units) NCX†

UPPER-DIVISION COURSES

Note: A laboratory fee is required for each laboratory course. In addition, breakage charges will be assessed after each course has been completed.

101. Advanced Inorganic Chemistry

Aspects of atomic structure. Theories of chemical bonding and molecular geometry. Applications of symmetry and group theory. Coordination chemistry. Introduction to organometallic chemistry. Inorganic reactions and mechanisms. Laboratory 3 hrs/wk. *Prerequisite: Chemistry 150 or 151.* (5 units) NCX†

111. Instrumental Methods of Analysis I

Principles and use of instruments. Basic spectroscopic methods: ultraviolet-visible, infrared, atomic absorption, nuclear magnetic resonance, and mass spectroscopies. Basic chromatographic methods: gas and high-performance liquid chromatography. Laboratory 3 hrs/wk. *Prerequisite: Chemistry 152.* (5 units) NCX†

112. Instrumental Methods of Analysis II

Advanced spectroscopic methods. Selected electrochemical and thermoanalytical methods. X-ray diffraction. Laboratory 3 hrs/wk. *Prerequisites: Chemistry 101, 111, and 153.* (5 units) NCX†

120. Computer Applications in Chemistry

Introduction to BASIC programming. Use of PC, Macintosh, and VAX computing environments. Chemical applications including data acquisition, data analysis, and molecular modeling. *Prerequisites: Chemistry 10 and 36.* (4 units) NCX†

130. Organic Syntheses

Modern synthetic methods applied to the preparation of a varied assortment of compounds. Discussion of retrosynthetic concepts, including synthons and chirons, with emphasis on syntheses taken from the literature. Laboratory work includes micro and macro applications. Laboratory 4 hrs/wk. *Prerequisite: Chemistry 37.* (4 units) NCX†

141. Biochemistry I

Chemical principles as applied to biomolecules. Protein structure, enzyme function and regulation, chemical models for enzymes. Carbohydrate structure and metabolism, biological redox. Lipid structure and membrane organization. Structure of nucleotides. *Prerequisite: Chemistry 37.* (4 units) NCX†

142. Biochemistry II

Continuation of 141. Metabolic pathways of carbohydrates, lipids, and amino acids. Nucleic acid structure and function. Protein synthesis and subcellular testing. Membrane biochemistry and signal transduction; hormone action. *Prerequisite: Chemistry 141.* (4 units) NCX†

143. Biochemical Techniques

A laboratory course emphasizing fundamental theory and practice in biochemical laboratory techniques including preparation and handling of reagents; isolation,

† Exempted from challenge

purification, and characterization of biomolecules; enzyme kinetics; spectrophotometric assays; use and handling of radiotracers; electrophoretic and immunological techniques. Laboratory 6 hrs/wk. *Prerequisites: Chemistry 10, 142 (may be taken concurrently) and either Chemistry 150 or 151, or permission of instructor.* (2 units) NCX†

150. Physical Chemistry for the Life Sciences

Principles of chemical thermodynamics with applications to biological systems. Laws of thermodynamics. Electrochemistry. Biological oxidations. Thermodynamics of solutions. Transport properties of macromolecules. Survey of spectroscopy. Intended for students majoring in the biological sciences. Does not count toward a major in chemistry. *Prerequisites: Chemistry 10 and 36 and Math 11.* (4 units) NCX†

151. Physical Chemistry I

Introduction to spectroscopy with survey of methods common to instrumental analysis. Fundamentals of chemical thermodynamics. Energy, entropy, and Gibbs free energy. Partial derivatives. Equilibrium. Phase diagrams. Non-ideal gases. Laboratory 4 hrs/wk. *Prerequisites: Chemistry 10, Math 13, and Physics 6 or 22.* (5 units) NCX†

152. Physical Chemistry II

Ideal and non-ideal solutions. Electrochemistry. Chemical kinetics. Kinetic theory of gases. Laboratory 4 hrs/wk. *Prerequisite: Chemistry 151.* (5 units) NCX†

153. Physical Chemistry III

Quantum chemistry and spectroscopy. Particle in a box. Rigid rotor. Harmonic oscillator. Hydrogen-like atoms. Pauli principle and term states. Bonding theories. Laboratory 4 hrs/wk. *Prerequisite: Chemistry 152.* (5 units) NCX†

181. Use of Chemistry Literature

Introduction to library resources in chemistry, including computerized databases. Written and oral reports. *Prerequisites: Chemistry 10 and 37.* (2 units) NCX†

182. Undergraduate Research

Execution of experimental or theoretical research. Three hours/week of work per unit of credit. Oral presentation and written report constitute a portion of the third unit. Regular attendance at seminars. *Prerequisites: Chemistry 181 and consent of instructor.* (1–3 units) NCX†

191. Special Topics in Organic Chemistry

Advanced topics in selected areas of organic chemistry such as natural products (the study of the structure determination, biosynthesis, and laboratory synthesis of plant secondary metabolites); physical organic chemistry (the study of molecular structures on a theoretical basis, quantitative structure-reactivity relationships, mechanisms, and stereochemistry); or other topics that may be offered occasionally. *Prerequisites: Chemistry 37 and others, depending on the specific offering.* (4 units) NCX†

192. Special Topics in Physical/ Inorganic/Analytical Chemistry

Advanced topics in selected areas of physical, inorganic, or analytical chemistry such as nuclear chemistry and radiochemistry (the study of nuclear structure, radioactive decay, nuclear reactions, and the interaction of radiation with matter); polymer chemistry (the study of macromolecules; kinetics and thermodynamics of polymerization; and characterization, morphology, fabrication, and testing of polymers); or other topics that may be offered occasionally. *Prerequisites: Chemistry 36 and 150 or 151 and others, depending on the specific offering.* (4 units) NCX†

† Exempted from challenge

199. Independent Study in Chemistry

Detailed investigation and directed reading on advanced topics, under the close supervision of a faculty member. Permission of the dean, department chair, and instructor must be obtained before registration. (Credit to be arranged.) NCX†

† Exempted from challenge

DEPARTMENT OF CLASSICS

Associate Professors: William S. Greenwalt, John R. Heath, Helen E. Moritz *(Chair)*, William J. Prior (courtesy of Philosophy Department)
Senior Lecturer: John R. Dunlap

Classics in the broad sense is the study of all aspects of the life and culture of ancient Greece and Rome. The Classics Department concentrates on the languages (ancient Greek and Latin) and literatures of those cultures and also offers courses in various aspects of ancient civilization.

A major in classics prepares the student for graduate study in such fields as classical literature, classical archaeology, ancient history, comparative literature, and biblical studies. Teaching classics at the high school or college level requires certification or an advanced degree. Because of the multidisciplinary nature of the field, classics provides a general liberal arts curriculum that is an excellent background for careers in many areas.

Every course in the department is open to any interested student with the necessary preparation. Classics courses, such as Mythology, Classical Tragedy, and Ancient Greek and Roman Religion, require no knowledge of an ancient language. Latin or Greek may be taken to satisfy the foreign language requirement. Nonmajors preparing for graduate study in certain areas of history, philosophy, English, or Scripture may wish to acquire a knowledge of Latin or Greek as a research tool in those fields.

Majors are available in several programs in Classical Languages and Literatures—Latin, Greek, Latin and Greek— and in Classical Studies, a multidisciplinary program. A minor is offered in Latin, Greek, or Classical Studies. Because course offerings in any one term are limited, students wishing a classics major are encouraged to plan their curriculum in consultation with a faculty adviser at the earliest possible date. In addition to completing the major requirements specified below, classics majors must fulfill University Curriculum and Bachelor of Arts requirements.

CLASSICAL LANGUAGES AND LITERATURES

These programs emphasize the study of ancient languages and the literature surviving in those languages and are supported by courses in other aspects of ancient literature and civilization.

Majors who plan to do graduate work in classics should acquire at least a minimal familiarity with both Latin and Greek.

In addition to any lower-division courses in Latin or Greek that the student may require, majors must complete the following courses:

Requirements for Major and Minor

Major in Latin or Greek Nine upper-division courses in the language of concentration and a senior project (Classics 198)

Major in Latin and Greek Nine upper-division courses in the ancient languages, with at least six of these in a single language, and a senior project (Classics 198)

Minors in either Latin or Greek require completion of 20 upper-division units in the language.

Students in these programs are strongly encouraged to fulfill the Western Culture requirement with English 11, 12, 13 (Literature I, II, III).

Recommended Electives

Lower Division Classics 65 (Classical Mythology); History 11 (Ancient); Philosophy 11 (Classical & Medieval); Art 11 (Art History I); Classics 66 (Greek and Roman Religion)

Upper Division Literature and culture courses in the Classics 170- and 180- series and history courses in the Classics 110-series

At least one course in Latin literature (120–139) and one course in Greek literature (150–169) are regularly offered each academic quarter. These courses are cycled in order to ensure majors the opportunity of studying the greatest number of major authors and genres without duplication during their program. Although each of the upper-division courses in Latin and Greek is ordinarily offered at least once in three or four years, listing in the *Bulletin* does not guarantee that a course will be offered in any given year.

CLASSICAL STUDIES

For students interested in the bases of Western civilization, this program offers a broad curriculum in language, literature, history, philosophy, and art unified by a concentration on the classical periods in ancient Greece and Rome. Courses in Latin or Greek language and in classical literature (in the original or in translation) are its core, but the program emphasizes a comprehensive understanding of the foundations of Western culture rather than a single discipline.

Requirements for Major and Minor in Classical Studies

The major requires the following courses:

1. A minimum of *five* courses in Latin or Greek, which may include the elementary sequence (this simultaneously fulfills the foreign language requirement for the Bachelor of Arts degree). Students entering with prior study of Latin or Greek may substitute up to two courses in classical literature with *advance* approval of the department chair.
2. Additional lower-division requirements: Classics 65 (Classical Mythology); English 11, 12, 13 (Literature I, II, III); History 11 (Ancient); two courses from Philosophy 11 (Classical & Medieval), Art 11 (Art History I), and Classics 66 (Greek and Roman Religion)
3. Additional upper-division requirements—six courses, distributed as follows:
   a. Two courses in classical literature: at least one from Classics 175, 180, 181, 182, 183; the other from these or from the Classics 120-, 130-, 150-, and 160-series (upper-division Greek and Latin literature)
   b. One course in classical culture from Classics 177, 178, 185, 186, 188; Political Science 111 (History of Political Theory I)
   c. One additional course in classical literature or culture
   d. Two courses in ancient history from Classics 110, 111, 112, 176
   e. Classics 198 (Senior Project)

The minor requires the following:

1. Fulfillment of the foreign language requirement for the Bachelor of Arts in Latin or Greek
2. Classics 65
3. Art 11
4. Classics 61 or English 11
5. History 11 or one upper-division course in ancient history
6. Additional upper-division courses
   a. Two courses in classical literature, in the original or in translation
   b. One course in ancient literature, history, philosophy, or art

Students in the Classical Studies program are encouraged to fulfill the Western Culture requirement with English 11, 12, 13 (Literature I, II, III) and the intermediate religious studies requirement with Religious Studies 51 (Ancient Greek and Roman Religion).

TEACHING AUTHORIZATION IN LATIN

Although Santa Clara University does not have a state-of-California-approved Subject-Matter Preparation Program in Latin, those who already hold a valid single-subject credential in another subject (e.g., English or a modern language) may add supplementary authorization in the teaching of Latin if they have completed a total of 30 quarter units or 15 upper-division quarter units of college course work in Latin. Students interested in teaching Latin in California public schools

should consult the department chair about their program at the earliest possible date.

LATIN

11, 12. Elementary Latin I, II

Introduction to vocabulary, forms, and grammar of classical Latin. Development of reading skills with supporting exercises in writing. No language laboratory.

13. Elementary Latin III

Completion of Latin grammar. Introduction to reading Latin literature.

31. Latin Grammar Review

Rapid review of Latin grammar. Especially for students wishing to refresh their high school Latin.

121. Caesar

Representative selections from the *Commentarii* on the Gallic War and/or the *Bellum Civile.* Consideration of the adaptation of history to political ends.

122. Catullus

Lyric poems, short epigrams, and longer mythological poems by the late Republican poet of personal love and sophisticated society.

123. Roman Comedy

One or more plays by Plautus or Terence. Origins and nature of Roman comedy.

124. Ovid

Selections from the major works, which include love poems, *Amores;* a handbook for amatory success, *Ars Amatoria;* and the epic compendium of mythology, the *Metamorphoses.*

125. Cicero: Philosophical Works

Consideration of Cicero's eclectic philosophy through a careful reading of one or more of his philosophical dialogues, e.g., *De Amicitia, De Senectute,* or *The Dream of Scipio.*

126. Cicero: Oratory and Rhetoric

One or more exemplars of Cicero's rhetorical style (e.g., Catilinarian Orations, *Pro Archia*) or rhetorical theory (e.g., *De Oratore*). Consideration of rhetorical form, figures, and *topoi.*

127. Vergil: Aeneid

The epic poem on the effort of founding Rome and the cost of its greatness. Consideration of the traditional and innovative features of Vergil's epic style and purpose. Attention to epic metre.

131. Vergil: Eclogues and Georgics

Vergil's earlier works: pastoral poems set in an idealized landscape and the didactic poem on the agriculture and countryside of his native Italy.

132. Horace

Selections from the odes and epodes. Attention to the adaptation of Greek lyric forms and rhythms to the Latin language.

133. Livy

Selections from the *Ab Urbe Condita*—the history of Rome from its semi-mythical founding through monarchy, early Republic, and Punic Wars.

134. Roman Satire

Representative selections from among the works of Horace, Juvenal, and others. Origins and development of the satiric mode in Latin literature.

135. Medieval Latin

Major works of prose and poetry from the fourth century to the Renaissance. St. Augustine's *Confessions;* the histories of Gregory of Tours, Bede, and Einhard; Latin fables; popular songs such as the *Carmina Burana;* and the humanistic writings of Dante and Petrarch.

137, 138. Special Topics: Poetry Special Topics: Prose

Occasional courses in selected authors or genres for advanced students. Possible topics: Lucretius or elegy in poetry; Cicero's letters, Tacitus, or other Roman historians in prose.

GREEK

21, 22. Elementary Greek I, II

Introduction to vocabulary, forms, and grammar of Attic Greek. Development of reading skills with supporting exercises in writing. No language laboratory.

23. Elementary Greek III

Completion of Greek grammar. Introduction to reading Greek literature.

105. Advanced Greek I

Selected aspects of Greek grammar in the context of reading excerpts from Greek prose and poetry. *Prerequisite: Greek 23 or equivalent.*

106. Advanced Greek II

Greek readings comprising an introductory survey of major authors and genres.

151. Lucian

Selections from the author's satirical treatments of mythology, history, philosophy, and rhetoric (e.g., *Dialogues of the Dead*) and/or from the fantasy called *A True Story.* Lucian's place in the Second Sophistic.

152. Homer: Odyssey

Selected passages demonstrating the fusion of the heroic and the romantic in an epic of peacetime. Consideration of epic metre and conventions.

153. Euripides

A complete tragic drama. Attention to characterization, dramatic structure, and poetry, and to Euripides' place in the history of tragedy. Metrical reading of dialogue.

154. Herodotus

Selections from the *Persian Wars.* Herodotus' achievements and limitations as the "Father of History." Peculiarities of the Ionic dialect.

155. Plato

Careful reading from one or more dialogues such as *Apology, Crito, Phaedo,* and *Republic.* Detailed study of dialogue mode of discourse; overview of Plato's philosophy.

156. Greek New Testament

Readings selected from the Koine Greek text of the New Testament with a concentration on the gospels, John, or the epistles. Close reading of the text with a view to theological implications of the vocabulary. Introduction to primary research tools.

161. Homer: Iliad

Selected passages illustrating the course and consequences of the Wrath of Achilles and the nature of the hero. Consideration of epic metre and conventions.

162, 163. Sophocles; Aeschylus

A complete tragic drama. Attention to characterization, dramatic structure, and poetry, and to the author's particular contributions to the development of the tragic form. Metrical reading of the text.

164. Oratory

Selections from a representative Greek orator such as Demosthenes or Lysias. Consideration of classical rhetorical forms and *topoi.*

165. Lyric Poetry

Fragments of Alcaeus, Archilochus, Sappho, Simonides, and others. Development of elegiac, iambic, and melic forms.

167, 168. Special Topics: Poetry Special Topics: Prose

Occasional courses in selected authors or genres for advanced students. Possible topics: Hesiod or Pindar in poetry, Thucydides or Xenophon in prose.

CLASSICS

Note: Knowledge of an ancient language is not necessary for the following courses.

50. Technical Terminology

Introduction to technical vocabularies, especially in life sciences, through their roots and origins in Greek and Latin.

51. Greek and Latin Etymology of English

A practical study of the influence of Greek and Latin on the development of the English language. Vocabulary building through the recognition and use of Greek and Latin roots in English combined with theoretical and semantic issues.

61. Survey of Classical Literature

Historically and culturally based survey of major Greek and Latin authors from Homer through St. Augustine. Introduction to the principal literary genres of antiquity, epic, tragedy, comedy, philosophical dialogue, and satire. (Also listed as English 11.)

62. Survey of Ancient History

Interdisciplinary survey of the development of Western culture from the Near Eastern origins of Western civilization through the collapse of the Roman Empire. (Also listed as History 11.)

65. Classical Mythology

Principal gods and heroes of Greek and Roman antiquity: their stories, significance, and pictorial representations. Implications of myth in society and possible origins of myth. Important background for European and English literature. (Also listed as English 65.)

66. Ancient Greek and Roman Religion

Pagan religious culture in the Classical Mediterranean world. Consideration of the differing religious attitudes and expectations of polytheisms and monotheisms and of religious expression in the context of cult and ritual. (Also listed as Religious Studies 51 and History 16.)

110. Ancient Greece

A survey of Hellenic history from the Bronze Age to Alexander the Great. Emphasis on the rise and fall of the polis as an independent social, cultural, and political community. (Also listed as History 110.)

111. Hellenistic Age and the Rise of Rome

The Hellenistic world and Alexander the Great's successors. Rome from its origins to its conquest of the Mediterranean and Gaul. The collapse of the Roman Republic and establishment of the Principate. (Also listed as History 111.)

112. Roman Empire

A political, social, and cultural survey of the Roman Empire beginning with Augustus and tracing changes in Rome from the development of the Roman Empire as a world state to the development of Chris-

tianity as a world religion. (Also listed as History 112.)

175, 176, 177, 178. Topics in Classical Literature, Ancient History, Ancient Philosophy, Classical Culture

Occasional courses in specialized topics. Consult current course descriptions for details.

180. Classical Epic

The *Iliad* and *Odyssey, Argonautica,* and *Aeneid* in translation. Characteristics and historical development of epic genre and epic hero. (Also listed as English 184B.)

181. Classical Tragedy

Representative works of the principal Greek tragic playwrights: Aeschylus, Sophocles, and Euripides. Features of the tragic genre, its origins, and the conventions of its performance. At the discretion of the instructor, may include satyr drama and/or the Roman tragedy of Seneca. (Also listed as English 110 and Theatre and Dance 110.)

182. Ancient Comedy, Wit, and Humor

An investigation of the various styles of and approaches to humor in the ancient Greek and Roman world, as seen through the genres of comedy, satire, spoof literature, and invective. Besides the works of the comic dramatists (e.g., Aristophanes and Plautus) and satirists (e.g., Petronius and Juvenal), the course considers satyr drama, epigram, and "novellas" such as Lucian's *A True Story* and Apuleius' *Golden Ass.* (Also listed as English 111 and Theatre and Dance 111.)

183. Greek and Roman Historiography

A survey of the origin and development of historical prose from Herodotus through Ammianus Marcellinus. Consideration of history as an artistic genre; special attention to the authors' various political and ideological purposes. (Also listed as History 115.)

185. Women in Antiquity‡

Greek and Roman women from prehistoric times through the Roman Empire, from domestic, legal, and cultural perspectives. Special attention to select women of note. (Also listed as English 184A.)

186. Family in Antiquity

A survey of the family's social, economic, political, and religious roles in various ancient Greek states and in Republican and Imperial Rome. (Also listed as History 114.)

188. Art and Architecture of the Classical World

Architecture, sculpture, and painting from the Archaic through the Roman period, with special emphasis on major artists and monuments such as the Parthenon, the Altar of Zeus at Pergamon, Trajan's column; the sculptors Polykleitos and Lysippos; and the painters Parrhasios and Zeuxis and how they reflect artistic developments and classical culture. (Also listed as Art 170.)

198. Senior Project

Directed research project and paper for senior Classics majors.

199. Directed Reading/Research

Individually designed programs of reading or research, in Latin, Greek, or Classics (i.e., literature in translation or culture). Available to advanced students. Written permission of the instructor and department chair required in advance of registration.

‡ Course included in Women's Studies program

COMBINED SCIENCES

Program Coordinator: John B. Drahmann (Physics)
Program Council: Carolyn G. Bellinger-Kawahara (Biology), Joseph F. Deck (Chemistry, honorary lifetime member), Philip R. Kesten (Physics), Robert Numan (Psychology), Robert J. Pfeiffer (Chemistry), Dennis C. Smolarski, S.J. (Mathematics)

The College of Arts and Sciences offers a Bachelor of Science in Combined Sciences for students who wish to include study of both the natural and social sciences in their undergraduate program. The combined sciences major includes extensive study of both areas of science; students emphasize either the social or natural sciences.

The breadth of the combined sciences curriculum is excellent preparation for careers in a number of professional areas, including medicine, dentistry, and other health-related professions; law; business; and teaching.

Combined Sciences provides special programs for students who want to teach high school biology, chemistry, or physics. The Bachelor of Science in Combined Sciences with an emphasis on the natural sciences in (1) life science/biology, (2) chemistry, or (3) physics has been approved by the state of California as an alternative to the specific subject examination in one of these fields, which is otherwise required to apply for a teaching credential program.

For the details regarding combined sciences options, consult the program coordinator, John B. Drahmann, Department of Physics.

REQUIREMENTS FOR MAJOR

Students must complete the University Curriculum and the requirements of the College of Arts and Sciences. Students choosing the natural science emphasis should complete the core requirements for the Bachelor of Science degree in the natural science area; those choosing the social science emphasis should complete the requirements for the social science area. Students must maintain a C average in the courses specified in their major, which may not be taken pass/not pass.

In addition to the required courses for an emphasis in either natural science or social science, the major in combined sciences must take the following courses:

1. Mathematics 11, 12, and 13 (Calculus and Analytic Geometry I, II, and III)
2. Natural Sciences
   a. Biology 91, 92, and 93 (Populations, Physiology, and Cells)
   b. Chemistry 5 and 6 (General Chemistry I and II)
3. Social Sciences
   a. Economics 1 and 2 (Principles of Economics I and II)
   b. Political Science 1 (Introduction to U.S. Politics)
   c. Psychology 10 (Psychology as a Natural Science) and 11 (Psychology as a Social Science)
   d. Sociology 1 (Principles of Sociology)

4. Seven upper-division courses in the natural and social sciences, one of which must be either Sociology 118 or 121

EMPHASIS PROGRAMS

Natural Science Students choosing the emphasis in natural science must also complete Chemistry 35, 36, and 37 (Organic Chemistry I, II, and III) and Physics 4, 5, and 6 (Physics for Scientists and Engineers I, II, and III).

Social Science Students choosing the emphasis in social science must also complete Anthropology 3 (Introduction to Social and Cultural Anthropology); Chemistry 35 and 36 (Organic Chemistry I and II); Physics 20, 21, and 22 (General Physics I, II, and III); and Political Science 2 (Introduction to Comparative Politics).

PREPARATION IN COMBINED SCIENCES FOR ADMISSION TO TEACHING CREDENTIAL PROGRAMS

The state of California requires that students seeking a credential to teach physical or life science in California secondary schools pass either a subject-area examination in biology, chemistry, or physics, or complete the state-approved Subject-Matter Preparation Program in one of these areas. The credential itself requires a fifth year of study and student teaching.

Students enrolled in combined sciences select a curriculum that meets the requirements for the California Subject-Matter Preparation Program in the areas necessary to earn a credential. Education 98/198B is a recommended elective.

Course selection is quite critical, and students interested in the program should consult with the director of combined sciences at an early date.

DEPARTMENT OF COMMUNICATION

Associate Professors: Don C. Dodson, Thomas E. Shanks, S.J., Paul A. Soukup, S.J.
Assistant Professors: Christine M. Bachen *(Chair),* Stephen C. Lee, Laurie A. Mason, John H. McManus
Senior Lecturers: Patricia J. Bendigkeit, John A. Privett, S.J.
Lecturer: Karen E. Strother

The Department of Communication offers a program of studies leading to a Bachelor of Arts in Communication with an emphasis in television production or journalism—both print and broadcast. The major prepares students for graduate studies in communication theory or media and for careers in the communication industry. An academic minor is also available.

The communication major focuses on the communication *process* in interpersonal and mass media contexts. It explores the theory, research methodologies, responsibilities, and effects of mass and interpersonal communication. The de-

partment gives special consideration to new and developing communication technologies.

The major also integrates theory with practice. It allows students to apply their knowledge of the communication process to the study and creation of communication *products* (speeches, television programs, newspaper stories, etc.). Courses in basic and advanced public speaking are a special concern of the department.

The communication curriculum provides nonmajors with the opportunity to acquire a critical understanding of the communication process and contemporary media, to improve oral and written skills, and to heighten visual awareness.

REQUIREMENTS FOR MAJOR AND MINOR

Arts and Sciences

Students are expected to complete University Curriculum and College requirements. In addition, communication majors must complete one statistics course (e.g., Mathematics 8).

Students who choose either journalism emphasis must also complete

1. an introductory political science course (preferably Political Science 1, Introduction to U.S. Politics); and
2. an introductory economics course (preferably Economics 2, Principles of Economics II).

Communication

Lower Division All students complete Comm 1 (Introduction to Communication Processes), Comm 10 (Communication Research Methods I), Comm 12 (Technology and Communication), one course in public discourse (Comm 20, 23, or 25), Comm 30 (Television Production I), and Comm 40 (News Gathering and Writing I). Students who plan to emphasize television production also complete Comm 31 (Television Production II). Students who plan to emphasize journalism complete Comm 8 (The Communication of News).

Upper Division All students complete Comm 100, 101 (Communication Theory and Effects I and II), Comm 110 (Senior Thesis), and Comm 170 (Communication Law and Responsibility). Students also choose to emphasize television production, print journalism, or broadcast journalism as an applied area.

Television production students complete Comm 130 (Television Writing), Comm 133 (Television Directing), Comm 136 (Television Producing), and one communication elective chosen with the help of a faculty adviser.

Journalism students complete Comm 141 (News Gathering and Writing II); either Comm 144 (Presenting News for Broadcast) for broadcast journalists or Comm 145 (Presenting News for Print) for print journalists; Comm 146 (Public Affairs Reporting); and one communication elective chosen with the help of a faculty adviser.

Minor The minor in communication requires four lower-division and four upper-division courses. Although leeway is given for individual needs, required courses are Comm 1; 20, 23, or 25; and at least one upper-division theory course.

ADVISING

Because the communication field requires students with a broad liberal arts education, students work closely with a faculty adviser to plan a cohesive academic program that combines courses in the Communication Department with courses in other departments. Often students complete a minor or take a number of courses in related disciplines such as marketing, theatre arts, psychology, or political science.

All students are encouraged to complete at least a year of serious work on one of the student-run campus media. Special credit practica for such work may be included in the student's academic program.

Additionally, all junior and senior students are encouraged to complete an internship at an off-campus media organization; sophomore journalism students are also advised to consider an internship. The department maintains a list of potential internships that may be completed for credit as Communication 98 or 198.

LOWER-DIVISION COURSES

Note: For courses that charge fees, see the quarterly Class Schedule.

1. Introduction to Communication Processes

Overview of the communication process; effects and responsibilities of interpersonal and mass communication. Special consideration of media institutions, various communication models, and approaches to communication study.

8. The Communication of News

Analysis of theories of the press and characteristics of news as a form of interpersonal and mass communication. Overview of news media history. Ethical reasoning about news gathering and presentation. *Prerequisite: Comm 1.*

10. Communication Research Methods I

Introduction to communication as a social science and to methods for analyzing audiences, communication messages, and effects. Design, sampling, and basic computer data analysis. *Prerequisites: Comm 1, 12, and 20, 23, or 25.*

12. Technology and Communication

Examination of the relationship between society and communication technology—past, present, and future. Hands-on introduction to the basic functions of the computer as a communication tool, programmable "thinker," data sorter and searcher, and number cruncher. *Prerequisite: Comm 1.*

20. Public Speaking

Introduction to oral communication theory and practice: the role of the speaker, audience factors, and elements of the message that create an effective speech.

23. Oral and Written Communication

Theory and practice of clear, concise, written and oral communication to inform and to motivate. Messages directed to a specific audience in personal and professional situations.

25. Group Processes

Theory and practice of small task-oriented groups. Leadership skills. Interpersonal dynamics. Critical thinking and problem solving.

27. Intercultural Communication[§]

An analysis and comparison of communication styles and forms within and among cultural groups in the United States. Emphasis on the communicative behavior of co-cultures such as blacks, Asians, Chicanos, gays, women, and the aging and disabled.

30. Television Production I

Basic theory and technique of TV production. Studio and field assignments introduce the TV production process. Project planning, camera, audio, and basic directing. Occasional field production and editing.

31. Television Production II

Intermediate studio and portable equipment projects. Basic TV aesthetics, lighting, editing, language, and procedures necessary for directing. *Prerequisite: Comm 30.*

40. News Gathering and Writing I

Introduction to theories and techniques of gathering and writing news for mass media. Fundamentals of news values, audience information needs, objectivity, journalistic style, and interviewing. Primary emphasis on writing for newspapers. Introduction to writing for broadcast. *Prerequisites: English 1 and 2 and, for journalism students, Comm 8.* (Also listed as English 74.)

88. Publications Practicum

A 2-unit course that examines current directions in the publication industry, chiefly through presentations by journalists, technical writers, designers, and specialists in book and magazine publication. Introduction to Aldus Pagemaker.

89. Radio Broadcasting Practicum

A 1-unit course for students working at KSCU, the University radio station. Radio station concepts and practices; production, sales, and business operations; real-world concepts of programming, music formats, and ad presentation; and vocal presentation techniques.

90. Yearbook Practicum

A 1-unit course for editors and students working on the University yearbook, *The Redwood.* Principles of photojournalism, graphic design, and book production. Discussion of significant work in progress.

91. Photojournalism Practicum

A 1-unit practicum for photo staff of the University newspaper or yearbook. Shooting, processing, and printing regular assignments for student publications. Basic knowledge of photography and darkroom techniques required.

92. Forensics Practicum

A 1-unit course for members of the speech and debate team. Supervised activity in forensics. Competition in debate and speaking events: persuasive, expository, extemporaneous, impromptu speaking, oral interpetation. Field trips required. *Prerequisite: permission of instructor.*

95. Journalism Practicum

A 1-unit course for editors and staff members of the University newspaper, *The Santa Clara.* Review of student writing. Practical advice and experience in journalism.

96. Public Relations Practicum

A 2-unit course involving planning, promoting, and attending public relations events.

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§ Course included in Ethnic Studies program

97. Communication Practicum

A 2-unit course for participants in department activities. Includes crew members, actors, researchers, lab assistants, and others as approved by instructor. *Prerequisite: permission of instructor or chair.*

98. Internship

Projects with recognized communication institutions outside the University. Written contract must be approved by internship coordinator and chair one week prior to registration.

UPPER-DIVISION COURSES

Note: For courses that charge fees, see the quarterly Class Schedule.

100. Communication Theory and Effects I

Theories and effects of communication on individuals. Emphasis on interpersonal communication. Meaning and codes; symbolic interactionism; conversation; rules theory; self-disclosure; gender issues. *Prerequisite: Comm 1.*

101. Communication Theory and Effects II

Mass communication theories and effects. Study of theories pertaining to audiences and their use of media (including new technologies) and media institutions and their practices. Theoretical perspectives drawn from the social science literature and cultural studies. *Prerequisites: Comm 10 and 100.*

110. Senior Thesis

Advanced qualitative and quantitative approaches to communication. Major qualitative or quantitative research project that involves study design, data collection and analysis, and report writing. *Prerequisites: Comm 10, 12, 100, 101, and a statistics course.*

120. Public Discourse

Consideration of the nature of public discourse in a particular area—such as how poverty, homelessness, and welfare are treated in mass media coverage—using rhetorical theory, cultural studies, and the social science literature. Examination of the factors that shape public discourse and how communication might be improved to serve more effectively the needs of a democratic society.

121. Minorities, Marginalization, and Public Discourse

Consideration of the theory and practice of minority representation in the public domain: media, advertising, museums, literature, and/or art. Examination of the process by which minorities are marginalized in public representation and how these images have been and are being challenged.

130. Television Writing

Creation of scripts for commercials, public service announcements, documentaries, and dramatic productions for television. Basics of formative research and television aesthetics. Ethics of television writing. *Prerequisite: Comm 31 or permission of instructor.*

133. Television Directing

Advanced principles and techniques of TV directing. Advanced TV aesthetics, narrative design, working with performers, and the direction of various formats. Working with producers. *Prerequisite: Comm 31.*

136. Television Producing

Theory and practice of organizing a commercial, public, or industrial television program. Assessing audience needs, developing creative show ideas, preparing production material. Budgeting and clearances. Postproduction evaluation of effect on audiences. *Prerequisites: Comm 31 and 130.*

141. News Gathering and Writing II

Advanced news reporting and writing. Emphasis on strategies for news gathering. Beat coverage. Database searches. Precision or "social science" journalism. Opportunities for specialized and in-depth reporting. *Prerequisites: Comm 10 and 40.*

144. Presenting News for Broadcast

Researching, writing, editing, and reporting radio and television news and documentaries. Creation of newscasts. Broadcast news ethics and law. *Prerequisite: Comm 141.*

145. Presenting News for Print

Fundamentals of copy editing and designing print presentation formats. Emphasis on concise, logical, explanatory, and attention-getting presentation of words, graphics, and photographs. *Prerequisite: Comm 141.*

146. Public Affairs Reporting

Observation and reporting on the workings of government, including courts, police, and social issues. Presentation may be either broadcast or print. *Prerequisite: Comm 144 or 145.*

149. Public Relations and Corporate Communication

Theories and practice of public relations. Practical project involving advocacy writing, effective planning, and objective evaluation. The function of public relations in organizational settings. Ethics for public relations professionals. (Also listed as Mktg 197.)

150. The Narrative Art of Film

The art and craft of visual images, sound, and motion in film. Aesthetic analysis and criticism. Viewing of classic and contemporary films.

170. Communication Law and Responsibility

Legal and ethical standards for the media. Responsibilities of communicators in interpersonal and mass communication. Case studies. Consideration of new technologies. *Prerequisite: Comm 1.*

172. Media Criticism

Methods of critical and cultural analysis of various media forms. *Prerequisite: Comm 1 or permission of instructor.*

180. Communication and Cultural Development

The impact of communication on culture, tracing shift from oral to print to electronic cultures. Special attention to rise of the newspaper, film, advertising, and television in the United States. Offered alternate years. *Prerequisite: Comm 1.*

181. Communication Media and Technology in Education

Exploration of the alternative uses of communication, particularly as applied to education. Theory and practice in distance education, instructional television, and interactive video computer-assisted education. Examination of current implementations of the technologies.

183. International Telecommunication

Introduction to the international dimensions of broadcasting in first, second, and third worlds; shortwave and satellite communication; cable, video, and VCRs; telephony; and data communication.

184. Information Campaigns

The use of media and interpersonal communication in campaigns to change attitudes and behaviors. Case studies in antismoking, antidrug, environmental, and political campaigns and propaganda. Audience analysis, message design, and evaulation. Campaign design for local agencies or organizations.

185. Youth and Media

Examination of media content aimed at children and adolescents. Effects of media on development. Sex-role socialization. Aggression. Consumerism. Impact of new

technologies on media developments, including computers and music videos.

188. Publications Practicum

A 2-unit course that examines current directions in the publication industry, chiefly through presentations by journalists, technical writers, designers, and specialists in book and magazine publication. Introduction to Aldus Pagemaker.

189. Radio Broadcasting Practicum

A 1-unit course for students working at KSCU, the University radio station. Radio station concepts and practices; production, sales, and business operations; real-world concepts of programming, music formats, and ad presentation; and vocal presentation techniques.

190. Yearbook Practicum

A 1-unit course for editors and students working on the University yearbook, *The Redwood.* Principles of photojournalism, graphic design, and book production. Presentation and critique of significant work in progress.

191. Photojournalism Practicum

A 1-unit practicum for photo staff of the University newspaper or yearbook. Shooting, processing, and printing regular assignments for student publications. Basic knowledge of photography and darkroom techniques required.

192. Forensics Practicum

A 1-unit course for members of the speech and debate team. Supervised activity in forensics. Competition in debate and speaking events: persuasive, expository, extemporaneous, impromptu speaking, oral interpetation. Field trips required. *Prerequisite: permission of instructor.*

193. Computer Design Workshop

An interdisciplinary workshop for engineering, art, and communication students. Graphics computers and software. Students work in teams to explore solutions to social problems, use the computer to illustrate solutions, and complete formal presentations of their findings. Limited enrollment. *Prerequisite: permission of instructor.* (Also listed as Art 193 and MECH 193.)

194. Career Practicum

A 2-unit course leading students through steps designed to identify a career path in the communication field. Career search strategies. Informational interviews. Enrollment restricted to communication majors.

195. Journalism Practicum

A 1-unit course for editors and staff members of the University newspaper, *The Santa Clara.* Review of student writing. Practical advice and experience in journalism.

196. Public Relations Practicum

A 2-unit course involving planning, promoting, and attending public relations events.

197. Communication Practicum

A 2-unit course for participants in department activities. Includes crew members, actors, researchers, teaching assistants, and others as approved by instructor. *Prerequisite: permission of instructor or chair.*

198. Internship

Projects with recognized communication institutions outside the University. Written contract must be approved by internship coordinator and chair one week prior to registration.

199. Directed Research/Creative Project

Independent studies. Directed reading in communication theory, research, responsibilities. Creative projects in television, print, or another medium. Written proposal must be approved by instructor and chair one week prior to registration.

DEPARTMENT OF ECONOMICS

Professors: Mario L. Belotti, William F. Donnelly, S.J., Alexander J. Field, John M. Heineke, Thaddeus J. Whalen Jr.
Associate Professors: Henry G. Demmert *(Chair)*, Laurence R. Iannaccone, Daniel P. McMillen, Thomas R. Russell, William A. Sundstrom
Assistant Professors: Mah-Lih Chen, Richard T. Coz, S.J., Linda Kamas, Laurence Levin, Helen Popper
W. M. Keck Foundation Professor: Mario L. Belotti
Michel and Mary Orradre Professor: Alexander J. Field

As one of the social sciences, economics studies how society produces, distributes, and consumes its goods and services, focusing particularly on the allocation of scarce resources among different sectors and households. This practical and highly relevant discipline provides insights into such real-world problems as unemployment, inflation, environmental deterioration, and world hunger. The study of economics emphasizes rigorous and systematic analysis and provides an excellent background for graduate study in economics, law, business, or government, as well as employment in the private and public sectors. The majority of economics graduates pursue careers in business, domestic and international banking, government, or private economic consulting.

REQUIREMENTS FOR MAJOR AND MINOR

Students majoring in economics, in addition to fulfilling University Curriculum and general requirements for a Bachelor of Science degree, must complete the following departmental requirements:

Lower Division

1. Economics 1, 2, and 14
2. BA 40 and 41
3. Two math courses: Mathematics 11 and 12 or 30 and 31

Upper Division

1. Economics 115 and 116
2. One course from Economics 122, 128, or 180
3. One course from Economics 120, 124, or 126
4. Three upper-division economics electives
5. Capstone Course 162 or 188

The minor in economics offered through the College of Arts and Sciences requires Economics 1, 2, 14, and 115; either BA 41 or Economics 174; and any three other upper-division courses. The student must also take Mathematics 11 and 12 or 30 and 31 and BA 40.

Note: Students are strongly encouraged to take BA 40 and 41 and Aggregate Economic Theory (Economics 115) in consecutive quarters.

EMPHASIS IN MATHEMATICAL ECONOMICS

The Mathematics and Economics departments jointly offer a program providing an emphasis in mathematical economics. Students wishing to participate major in either mathematics or economics but pursue a course of study that emphasizes the use of mathematics in the study of economics. Participation in the program is noted on the student's transcript. This program is especially suited for students planning graduate work or careers in actuarial science, economics, mathematics, operations research, systems engineering, or related fields. In addition to University and College requirements, all students in the program must complete specific requirements in their major department as well as the following courses:

1. Economics 14, 115, 170, 171, and 177
2. Mathematics 21, 22, 52, 53, 102
3. Economics 174 *or* Mathematics 122 and 123

With the permission of the Economics chair, students may substitute an economics elective for Economics 170 or 171. Full descriptions of the program may be obtained from the chairs of the Department of Economics or Mathematics.

LOWER-DIVISION COURSES

1. Principles of Macroeconomics I

Introduction to the general principles, terminology, and methods of macroeconomics.

2. Principles of Microeconomics I

Introduction to the theory of demand, production, cost, and pricing. *Prerequisite: Math 6, 7, 11, or 30.*

3. Principles of Economics III

Contemporary economic issues and problems. Use of the methodology and tools learned in Economics 1 and 2 to investigate in detail some of the major economic issues of the day. *Prerequisites: Economics 1 and 2 or permission of the instructor.*

14. Principles of Microeconomics II

Continuation of Economics 2. Consumer theory, imperfect competition, welfare economics. Required of majors and students in the Leavey School of Business and Administration. *Prerequisites: Math 11 or 30.*

UPPER-DIVISION COURSES

Prerequisites: Economics 1 and 2, or approval of the Undergraduate Committee, are required for all upper-division courses.

114. Microeconomics I

Introduction to the theory of demand, production, cost, and pricing.

115. Aggregate Economic Theory

Macro, or aggregate, aspects of the economy, emphasizing modern macroeco-

nomic models for explaining the level of output, employment, and prices. *Prerequisite: Economics 173 or BA 41.*

116. History of Economic Thought

Evolution of economic ideas and their influences on the development of economic practices. *Prerequisites: Economics 14 and 115.*

117. European Economic History

Study of the preindustrial environment and industrial growth patterns of Western Europe.

119. American Economic History

Study of growth and institutional change in the U.S. economy since colonial times. Topics include early industrialization, the economics of slavery, and the rise of large business enterprises and labor unions. *Prerequisite: Economics 115.*

120. Economics of the Public Sector

Microeconomic analysis of the role of government in the market economy. Supply of public goods and services, government's role in controlling externalities and regulating private industry, and the economics of the political process. *Prerequisite: Economics 14.*

122. Money and Banking

Theoretical, institutional, and historical approach to the study of money and banking, with particular emphasis on the relationship between the monetary and banking system and the rest of the economy. *Prerequisite: Economics 115 or permission of instructor.* (Students may not take *both* Economics 122 and Finance 126 for credit.)

124. Industrial Organization

Microanalysis of the structure, conduct, and performance of U.S. industry. *Prerequisite: Economics 14.*

126. Economics and the Law

Application of the tools of economic theory to the analysis of law and legal institutions as they exist in the contemporary United States. *Prerequisite: Economics 14 or permission of instructor.*

127. Public Finance: Taxation

Analysis of various tax policies and their effect on the economy. Individual income taxes, corporate income taxes, consumption taxes, payroll taxes, state and local taxes, and other alternative forms of taxation. *Prerequisites: Economics 14 and 115.*

128. Business Cycles and Forecasting

Study of the nature and causes of economic instability in an industrial economy. *Prerequisite: Economics 115 or permission of instructor.*

129. Economic Development

Analysis of the historical and theoretical context underlying present efforts to increase the rate of economic growth in underdeveloped countries.

130. Latin American Economic Development

Examination of the economic development of Latin American countries, with particular emphasis on the relationships between economic growth and their social, political, and economic structures.

132. Asian Economic Development

Study of the economic development of Asian countries with particular emphasis on the relationships between economic growth and their social, political, and economic structures.

135. Economic Development of Japan

Analysis of the historical development of the modern Japanese economy from the Meiji era to the present with an emphasis on the relationship between government, business, and labor.

136. 20th-Century Economic History

A study of 20th-century economic history.

140. Real Estate and Urban Economics

Examination of the economics of urban problems with emphasis on location and land use, the real estate market, and transportation. *Prerequisite: Economics 14 or permission of instructor.*

143. Real Estate

One quarter in senior year. Entails a research project on a specific program. Includes financing, marketing, development, and construction. (Open only to students admitted to the Real Estate program.)

144. Real Estate Studies Program Internship

One quarter spent as an employee of a real estate firm or lender. Students exposed to construction, appraisal, or financing. (Open only to students admitted to the Real Estate program.)

150. Human Resources Economics

Study of labor productivity, incomes, and employment and how these are affected by labor organizations and labor legislation.

161. The Economics of Race, Ethnicity, and Gender

Empirical and theoretical examination of economic issues relating to race, ethnicity, and gender. *Prerequisites: Economics 14 and 173 or BA 41.*

162. Economic Policy and Perspectives

Application of economic analysis to contemporary policy issues. To be taken during senior year. Satisfies Capstone Course requirement. *Prerequisite: Economics 115.*

163. Ethics and Economic Thought

Use of welfare economics to investigate the issues of distributive justice and market allocation. Topics include utilitarianism, Rawls maximin principle, Nash fairness, and Arrow's impossibility theorem.

170. Mathematical Economics and Optimization

Generalization and reformulation of many familiar micro- and macroeconomic models as mathematical systems. Focus on exploring the properties of these models using mathematical techniques and on static models. *Prerequisites: Mathematics 12 or 31, Economics 14 and 115, or permission of instructor.*

171. Mathematical Economics: General Equilibrium Theory

Study of the mathematical model of market equilibrium. Existence, uniqueness, efficiency, core equivalence, dynamics, and growth. *Prerequisites: Mathematics 12 or 31, Economics 14 and 115, or permission of instructor.*

173. Econometrics

Methods to analyze economic data. Time series data, index numbers, hypothesis testing, and simple regression. *Prerequisites: DISC 17 and 40.*

174. Statistical Analysis

Foundations of statistical research methods, including distribution theory, estimation, testing and prediction; special emphasis on multivariate models. *Prerequisite: Mathematics 12 or 31 or equivalent.*

177. Advanced Econometrics

Introduction to the techniques used by economists to estimate and test economic relationships. Focus on regression analysis, time series problems, and estimation of multiple equation models. *Prerequisite: Economics 173 or BA 41.*

180. International Economics

Analysis of the theory of international trade, problems in balance-of-payments adjustments, and international economics policies. *Prerequisite: Economics 14.*

182. International Business Economics

The institutions and processes influencing the environment for an enterprise involved in international business. Examination of the concepts, information sources, determinants of exchange rates, and evolution of the multinational corporation. Open only to nonmajors.

185. Economics of Technological Change

The economic consequences and causes of technological change. Examination of a succession of technological and organizational breakthroughs and the developments that made these breakthroughs possible.

188. Economics Seminar

Modern economic theories and problems. Admission by invitation only. Satisfies Capstone Course requirement. *Prerequisite: Economics 115.*

198. Internship

Opportunity for selected upper-division students to work in local governmental units or firms. *Prerequisite: upper-division standing and approval of the Undergraduate Committee.*

199. Independent Study

DEPARTMENT OF ENGLISH

Professor Emerita: Elizabeth J. Moran
Professors: James P. Degnan, Diane E. Dreher *(Chair)*, Francis X. Duggan
Associate Professors: Mary Judith Dunbar, Marilyn J. Edelstein, John C. Hawley, S.J., Christiaan T. Lievestro, Richard H. Osberg, Charles T. Phipps, S.J., Frederick P. Tollini, S.J., Fred D. White
Assistant Professors: Paul G. Bator, Terry L. Beers, Phyllis Brown, Eileen Razzari Elrod, Edward D. Gross, Bruce S. Henderson, Edward Kleinschmidt, Theodore J. Rynes, S.J., Bernice B. Zamora
Senior Lecturers: Mary Ann Aschauer, Simone J. Billings, John R. Dunlap, Susan Frisbie, Claudia Mon Pere McIsaac, Carol G. Rossi, Cory Wade, Jeffrey L. Zorn
Lecturers: Sherryl H. Booth, Jill Goodman

The Department of English provides students with a thorough undergraduate education in the liberal arts centered on the history, theory, and aesthetics of literature and the art of writing. The knowledge and skills developed in English courses are an excellent preparation for careers in law, government, business, communications, and education, as well as for graduate study in literature or writing.

REQUIREMENTS FOR MAJOR AND MINOR

In addition to University Curriculum requirements and requirements for the Bachelor of Arts degree, English majors must complete five lower-division En-

glish courses (not counting the three writing courses required by the College) and nine upper-division English courses. English majors ordinarily fulfill their College writing requirements by taking English 1 and 2 and English 20.

The Department of English offers its majors two programs: the Language, Literature, and Writing program, which provides students with a number of options; and the Subject-Matter Preparation Program for students interested in teaching English in California secondary schools.

The minor in English requires courses 41, 42, 43 (or 11, 12, and 13); 21; and four upper-division courses, including 116, 117, or 118.

LANGUAGE, LITERATURE, AND WRITING PROGRAM

This program is especially suitable for students planning to enter law school or an MBA program and for those intending further study in journalism, language, or linguistics. It is also designed to meet requirements for graduate studies in literature, writing, or education. The heart of the program is a three-course sequence in closely related topics. With its many upper-division options and electives, this program enables students, with the assistance of their academic advisers, to emphasize various areas of language and literature or creative and professional writing.

Lower-Division Requirements

Lower-division course requirements include the following six courses: English 11 (Literature I); English 20 (Introduction to Literary Study), which also fulfills the English major's third college writing requirement; English 21 (Introduction to Poetry); English 41, 42, and 43 (Survey of English Literature I, II, and III).

Note: The Western Culture: Literature I, II, III sequence (11, 12, 13) does not satisfy the University Curriculum requirement for English majors, who must follow a Western Culture sequence in the Art, History, Music/Theatre and Dance, or Philosophy departments.

Upper-Division Requirements

Students must distribute their nine required upper-division courses as follows:

1. Three courses from one of the following groups:
   American Literature
   a. Beginnings to World War I (119, 131, 132, 134, 136, 139)
   b. World War I to the present (119, 133, 135, 137–140, 150)
   British Literature
   c. Medieval and Renaissance literature (113, 116–118, 141–145)
   d. 17th- and 18th-century literature (114, 144–146, 151)
   e. Romantic, Victorian, and Edwardian literature (147, 148, 152, 155)
   f. 20th-century literature (114, 149, 150, 155, 167, 189)

Comparative Literature
g. Comparative literature (112, 161–163, 165–167, 169, 184B, 189)
Genre
h. Drama (110–114, 116–119, 155, 160, 162, 163, 170, 186, 186A)
i. Fiction (127, 134, 135, 138–140, 149–152, 155, 164, 167, 171)
j. Poetry (126, 136, 137, 142–148, 155, 161, 162, 172)
Language, Linguistics, and Writing
k. Language, linguistics, and writing (101–104, 180)
l. Writing (126, 127, 170–181, 197)
Theory and Contemporary Literature
m. Theory and contemporary literature (123–125, 138, 140, 150, 187)

2. One course in Shakespeare (116–118). If a Shakespeare course from one of the above groups has already been included, a course in Chaucer (142) or Milton (145) must be substituted to fulfill this requirement.
3. One upper-division course in American literature, if not already included in one of the above groups
4. One senior seminar (188)
5. Upper-division elective courses, at least one of which must be an English period course (141, 143–144, 146–149), if not already included from one of the above groups

Students may also propose thematic clusters (e.g., women's, religious, or ethnic literature) in conjunction with their advisers and the department chair.

Recommended Electives

English 103, 104, 116, 117, 118, 123, 124, 142, 145

PREPARATION IN ENGLISH FOR ADMISSION TO TEACHING CREDENTIAL PROGRAMS

The state of California requires that students seeking a credential to teach English in California secondary schools either pass a subject-area examination in English or complete the state-approved Subject-Matter Preparation Program in English. The credential itself requires a fifth year of professional study and student teaching.

The English Department offers courses that satisfy the requirements for the state of California Subject-Matter Preparation Program in English. The program is similar to the English major with some modifications. Requirements are organized in three strands: (1) writing (English 1, 2, 180); (2) literature (English 11, 20, 21, 41–43, upper- or lower-division ethnic literature, upper-division Shakespeare, upper-division American literature, senior seminar); and (3) linguistics and oral communication (English 101, 102, Comm 20).

Three electives must be chosen from the three strands and must include a period course. Recommended electives are English 103, 104, 131–133, 141–144,

146–150, 170–179, and 197. Education 98/198B is also recommended.

Note: Authors and topics listed in the following course descriptions are typical rather than definitive. They are not necessarily included in a specific course every time it is offered, and others not listed here may be included. Some courses are offered every year; all, ordinarily, are offered at least once every two years.

LOWER-DIVISION COURSES

1. Composition and Rhetoric I

Expository writing for college students. NCX†

2. Composition and Rhetoric II

Argumentation and research writing. *Prerequisite: English I or its equivalent.* NCX†

4, 5. Guided Writing I, II

Courses in composition for students with special linguistic needs that have become evident after they have completed English 1. Both courses must be taken to substitute for English 2. NCX†

7. Writing for International Students I

Practice in expository writing. Includes study of rhetorical principles, organization, and vocabulary development. Substitutes for English 1. NCX†

8. Writing for International Students II

Continuation of English 7. Focuses on writing in different academic disciplines. Includes a major research paper. Substitutes for English 2. NCX†

11, 12, 13. Western Culture: Literature I, II, III

Historical survey of Western literature from the ancient Greeks to the 20th century. Satisfies the University Curriculum Western Culture requirement for students who are not English majors.

20. Introduction to Literary Study

Introduction to the study of literature through critical reading, writing, and research.

21. Introduction to Poetry

Introduction to the study of poetry through critical reading and analysis.

27. Contemporary Novel

Readings in selected novels of the past decade.

30. Studies in American Literature

Selected authors, movements, genres in American literature. Designed for non-English majors.

35. African American Literature§

Readings in the African American literature of America.

36. Chicano Literature I§

Studies in the literary fusion of Spanish and Native American oral and written traditions.

37. Native American Literature§

Studies in Native American oral and written traditions.

† Exempted from challenge § Course included in Ethnic Studies program

41, 42, 43. Survey of English Literature I, II, III

Readings in the history of English literature from the beginnings to the present. Emphasis on the history of ideas and on the major authors.

54. Shakespeare

Readings in selected major plays.

65. Classical Mythology

See Classics 65.

67. Modern Novel

Readings in selected 20th-century novels.

68. Women's Literature‡

Introduction to the study of literature by and about women.

69. Women's Literature: Third World Women Writers in the United States§‡

A study of U.S. women of color writing in the context of their respective cultural and social histories. Analysis of the interplay of racial images. Modern writings comprise the core of the course.

70. Fundamentals of Creative Writing

Instruction and practice in the writing of poetry and fiction. *Prerequisites: English 1 and 2.* NCX†

71. Fiction Writing

Introduction to the writing of fiction. *Prerequisites: English 1 and 2.* NCX†

72. Poetry Writing

Introduction to the writing of poetry. *Prerequisites: English 1 and 2.* NCX†

73. Introduction to Magazine Writing

An introduction to the writing of articles, book reviews, and interviews. NCX†

74. News Gathering and Writing I

See Communication 40.

76. Writing Review

For sophomores who have completed English 1 and 2 and who now seek to strengthen those skills necessary for clear communication in their major fields.

79. Composition and Literature

Instruction and practice in writing expository prose. Combines writing instruction with a close reading of literary texts to serve as subjects and stimuli for writing. *Prerequisites: English 1 and 2.*

81, 82. Literary Topics I, II

Special topics in literature.

90. Literary Review Practicum

A 1-unit course for editors and staff of *Santa Clara Review*. Students meet weekly with a faculty member to discuss criteria by which to judge submissions of poetry and prose, in order to improve the quality of the writing the *Review* publishes. Students are graded P/NP only. May be repeated for credit.

95. Journalism Practicum

See Communication 95.

† Exempted from challenge ‡ Course included in Women's Studies program
§ Course included in Ethnic Studies program

UPPER-DIVISION COURSES

101. Linguistics

General survey of the science of linguistics: phonology, morphology, syntax, grammar, and usage.

102. Theories of Modern Grammar

Analysis of the basic problems of describing grammatical structure; traditional, structural, and transformational-generative grammars.

103. History of the English Language

Origin, structure, and development of the English language. Special attention to the morphology and syntax of Old English.

104. Teaching English as a Second Language (TESL)

Introduction to theories of instruction; survey of methods and materials used in the teaching of English to speakers of other languages. NCX†

110. Classical Tragedy

See Classics 181.

111. Classical Comedy

See Classics 182.

112. Modern Drama

See Theatre 112.

113. English Drama I

Non-Shakespearean drama in England to 1660. Medieval drama, Marlowe, Ford, Webster, Jonson.

114. English Drama II

Drama in England since the Restoration. Dryden, Wycherley, Congreve, Sheridan, Shaw, Eliot, and selected contemporary playwrights.

116. Shakespeare's Tragedies

An exploration of the great tragedies of Shakespeare's maturity: *Hamlet*, *Othello*, *Macbeth*, and *King Lear*. Requirements include viewing the plays on videotape and in-class performance work. Special attention to the theatrical, religious, moral, gender, and political dimensions of Shakespeare's tragedies.

117. Shakespeare's Comedies

An exploration of a selected number of Shakespeare's comedies from his early, middle, and late periods with particular attention to the social and sexual roles of men and women. Requirements include viewing the plays on videotape and in-class performance work.

118. Shakespeare's Histories

The personal and political world of Shakespeare's history plays with attention to leadership and values in *Richard II*, *Richard III*, *Henry IV*, and *Henry V*. Requirements include viewing the plays on videotape and in-class performance work.

119. American Drama

See Theatre 119.

123. History of Literary Criticism

Literary criticism from Plato to the present.

124. Contemporary Critical Theory

Major movements in contemporary critical theory.

125. Feminist Theory and Criticism‡

Study of 20th-century feminist literary theory and criticism. Examination of influences of gender on reading and writing literature.

† Exempted from challenge ‡ Course included in Women's Studies program

126. The Craft of Poetry

An intermediate writing course. Analysis and practice of image, line, diction, rhythm, rhyme, form, and other elements of the poet's craft. May be repeated once for credit.

127. The Craft of Fiction

An intermediate writing course. Analysis and practice in the technical aspects of fiction writing. May be repeated once for credit.

131. American Literature I

Historical study of American literature from its beginnings to the 1850s.

132. American Literature II

Historial study of American literature from the 1850s to World War I.

133. American Literature III

Historical study of American literature from World War I to the present.

134. American Novel I

The American novel before 1900. Authors may include Cooper, Hawthorne, Melville, Twain, James, Chopin, Crane, Dreiser.

135. American Novel II

The American novel in the 20th century. Authors may include Dreiser, Cather, Fitzgerald, Hemingway, Faulkner, Ellison, Barth, and other recent novelists.

136. American Poetry I

Historical study of American poetry of the 18th, 19th, and early 20th centuries. Taylor, Poe, Emerson, Longfellow, Whitman, Dickinson, Robinson, Frost.

137. American Poetry II

American poetry of the 20th century. Pound, Eliot, Williams, Stevens, Lowell, and more recent poets.

138. Contemporary American Literature

American poetry, fiction, and drama from 1960 to the present.

139. California Literature

Literature written by Californians and/or about California.

140. Chicano Literature II §

Advanced studies in Chicano and Native American traditions.

141. Medieval Literature

English literature other than Chaucer from 1300 to 1485. Medieval drama and lyric, Sir Gawain, Pearl, Langland, and Malory.

142. Chaucer

Study of *The Canterbury Tales* in the context of medieval literature and culture. Emphasis on Chaucer's language and style.

143. Renaissance Literature

The literature of England from 1485 to 1603. Sidney, Spenser, Marlowe, Shakespeare, and others.

144. The 17th Century

Nondramatic literature of England from 1603 to 1660. Jonson, Donne, Herrick, Milton, Marvell, Herbert, Browne.

145. Milton

A study of Milton's major poetry and prose.

146. Neoclassical Literature

Literature of England from 1660 to 1798. Dryden, Pope, Swift, Johnson, Boswell.

§ Course included in Ethnic Studies program

147. Romantic Movement

Nondramatic literature of England from 1798 to 1832. Blake, Burns, Wordsworth, Coleridge, Byron, Shelley, Keats.

148. Victorian Literature

Major writers of the Victorian period, including Carlyle, Brontë, Tennyson, the Brownings, Newman, Ruskin, Arnold, and Hopkins.

149. Modern British Literature

Nondramatic literature of England in the 20th century. Hardy, Conrad, Lawrence, Eliot, Auden, Graves, Forster, Woolf, Joyce.

150. Contemporary Literature

British and American poetry, fiction, and drama since World War II.

151. English Novel I

The 18th-century English novel. Defoe, Richardson, Smollett, Sterne, Fielding, Austen.

152. English Novel II

The 19th-century English novel. Scott, the Brontës, Dickens, Thackeray, Eliot, Meredith, Butler, Hardy.

155. Irish Renaissance

Irish literature in English of the late 19th and early 20th centuries. Yeats, Synge, Russell, Lady Gregory, Colum, O'Casey, Stephens, Joyce, O'Connor, O'Faolain.

160. Literature and Performance

See Theatre 160.

161. Comparative Humanism

Historical classical readings (drama, prose, poetry) on problems of humanism.

162. Classic and Romantic

Comparative readings in English and Continental Neoclassic and Romantic literature. Racine, Molière, Pope, Wordsworth, Byron, Shelley, Keats, Heine, Schiller, Hugo, Chateaubriand.

163. The Don Juan Theme

Variations on eros and agape from Plato and the earliest Spanish Don Juan play to Molière and Shaw. Comments by Rollo May and Erich Fromm.

164. African Literature

Readings in the contemporary literature of sub-Saharan Africa.

165. The Bible as Literature

Genres, styles, and themes of the Bible.

166. Pan-African Literature[§]

Readings in the literature of the black diaspora. Writers from Africa, the Caribbean, and the United States. Slavery, negritude, and Pan-Africanism.

167. Modern Fiction

Selected works of continental, English, and American fiction that are peculiarly modern in sensibility or style. James, Proust, Joyce, Gide, Kafka, Mann, Woolf, Lowry, Faulkner.

168. Women's Literature[‡]

Studies in literature by and about women. Authors, genres, and themes change from year to year.

169. Foreign Literature in Translation

Readings in a foreign literature. Areas and topics vary from year to year.

170. Play Writing

See Theatre 171. NCX[†]

[†] Exempted from challenge [‡] Course included in Women's Studies program
[§] Course included in Ethnic Studies program

171. Advanced Fiction Writing

Workshop in the writing of fiction. May be repeated for credit. *Prerequisite: English 71 or permission of the instuctor.* NCX†

172. Advanced Poetry Writing

Workshop in the writing of poetry. May be repeated for credit. *Prerequisite: English 72 or permission of the instructor.* NCX†

174. Literary Journalism

Writing for magazines and periodicals. Book reviews, satire, explication, and critical essays. May be repeated for credit. *Prerequisite: English 73 or 74, or permission of the instructor.* NCX†

175. Magazine Writing

Writing articles for magazines and periodicals. Emphasis on controversial political, cultural, and scientific topics. May be repeated for credit. *Prerequisite: English 73 or 74, or permission of the instructor.* NCX†

176. Exposition

Development of the expository writing skills of students who have satisfactorily completed their freshman composition requirements.

177. Advanced Composition

Extensive practice in academic writing such as biography, reviews, and interviews. Emphasis on stylistic development. *Prerequisites: English 1 and 2.* NCX†

178. Argumentation

Argumentative and persuasive writing, ideal for students planning careers in business, politics, or law. *Prerequisites: English 1 and 2.* NCX†

179A. Technical Writing

Writing in and about science and technology. Open to students of all majors; ideal for students planning careers in science, medicine, or engineering.

179B. Business Writing

Practice in the conventions of business writing. Emphasis on clear, concise memoranda; letters; and reports. Designed especially for students planning careers in business.

180. Writing for Teachers

Writing and the teaching of writing. Especially recommended for students planning careers in primary and secondary education. *Prerequisites: English 1 and 2.* NCX†

181. Writing for Publication

Tutorial for superior writers from all disciplines, including sciences, business, and engineering. Enrollment by permission of the instructor. May be repeated once for credit. Flexible scheduling. NCX†

182. Introduction to Technical Writing for Engineers

The basics of effective written technical communication, including problem analysis, audience analysis, document design, revision, and the design and use of graphics. Satisfies the third writing requirement for engineering majors. Open only to junior and senior engineering majors. *Prerequisites: English 1 and 2.* NCX†

184. Special Topics

Major authors, genres, literary movements, or themes.

184A. Women in Antiquity‡

See Classics 185.

† Exempted from challenge ‡ Course included in Women's Studies program

184B. Classical Epic

See Classics 180.

184C. Classical Mythology in the Western Tradition

See Classics 175.

186. Special Topics in Drama

See Theatre 186.

186A. Theatre Criticism

The theory and practice of stage and film criticism and reviewing.

187. Special Topics in Literary Criticism

188. Senior Seminar

Seminar in English or American literature for senior English majors. NCX†

189. Honors Seminar

Seminar for students in University Honors Programs and other invited students. Since topics change from year to year, this course may be repeated for credit with permission of the department chair. NCX†

190. Literary Review Practicum

A 1-unit course for editors and staff of *Santa Clara Review*. Students meet weekly with a faculty member to discuss criteria by which to judge submissions of poetry and prose, in order to improve the quality of the writing the *Review* publishes. Students are graded P/NP only. May be repeated for credit.

195. Journalism Practicum

See Communication 195.

197. Practicum in Tutoring Composition

For students of any major who wish to strengthen their writing skills by assisting freshman writers. Prospective students should consult the instructor. NCX†

198. Writing Internship

Work-study program for students of superior writing ability who gain course credit by supervised writing on newspapers, magazines, or for government or private agencies. Enrollment is by permission or invitation of the instructor and department chair. May be repeated once for credit. Students are graded P/NP only. NCX†

199. Directed Reading/Directed Research

In special circumstances and with permission of the department chair, a student may request a course in directed reading or writing from an instructor. May not be taken in a subject listed in this bulletin. NCX†

† Exempted from challenge

DEPARTMENT OF HISTORY

Professors Emeriti: Mary McDougall Gordon, Norman F. Martin, S.J., Matt S. Meier
Professors: Steven M. Gelber, Gerald McKevitt, S.J., Peter O'M. Pierson, David E. Skinner
Associate Professors: Ramon D. Chacon, George F. Giacomini Jr., William S. Greenwalt (courtesy of Classics Department), Arthur F. Liebscher, S.J., Jo Burr Margadant, Istvan I. Mocsy, Barbara Molony, Timothy J. O'Keefe, Robert M. Senkewicz, S.J. *(Chair)*, Thomas Turley
Assistant Professor: Dorothea R. French

History provides an understanding of all aspects of the human past. By synthesizing the humanities and social sciences, the study of history develops the ability to research, analyze, and communicate the reasons nations and peoples have evolved in particular ways. Knowledge and skills developed in history are excellent preparation for graduate study and careers in education, communications, government, law, and business.

REQUIREMENTS FOR MAJOR AND MINOR

The history major combines breadth and depth. Students engage the expanse of human culture through the required study of diverse geographical areas. Students study one culture more deeply by taking at least five courses in a required specialization area.

In addition to the general University Curriculum requirements and the degree requirements for the Bachelor of Arts, majors must complete at least 15 courses that meet the following requirements:

1. At least one course in each of the five geographical areas offered by the department: Africa/Middle East, East Asia, Europe, Latin America, and United States.
2. Four lower-division courses that include the study of at least *three* of the five geographical areas mentioned above, at least one of which must be in the student's area of projected individual specialization
3. Nine upper-division courses, four of which, including a Capstone Course (normally a seminar; always with History 100 and 101 as prerequisites), must be in the student's individual area of specialization. The normal specialization areas are the five geographical areas, but other geographical and/or chronological specialization areas may be developed by students in consultation with the departmental faculty.
4. History 100 (Historical Writing) and History 101 (Historical Interpretation); recommended at the end of the sophomore or beginning of the junior year (may be counted as lower- or upper-division courses).
5. Two courses outside of history in a student's specialization area that must be approved by the student's departmental faculty adviser.

A minor in history is also available. It requires a minimum of 32 units, at least 20 of which should be upper-division units.

HONORS IN HISTORY

History majors with at least a 3.5 grade point average in history (and not less than a 3.3 overall grade point average) at the end of the second quarter of the junior year may be invited by the department to become history honors students. History honors students must write a Senior Honors Thesis under the direction of a professor. The thesis is worth 10 upper-division history units, but history honors students must also take a ninth upper-division course. Theses are reviewed by a committee of three professors and, if found to be of honors quality, the student is granted a bachelor's degree with honors in history.

PREPARATION IN HISTORY FOR ADMISSION TO TEACHING CREDENTIAL PROGRAMS

The state of California requires that persons seeking a credential to teach history in California secondary schools either pass a subject-area examination in history or complete the state-approved Subject-Matter Preparation Program in history. The credential program itself requires a fifth year or study and student teaching.

For those interested in teaching history at the high school level, the History Department offers courses that satisfy the requirements for the state of California Subject-Matter Preparation Program in history. The program consists of 15 courses: nine upper division and six lower division. Five courses are in U.S. history, five are in Western civilization/world history/modern Europe, and five are in the history of the non-Western world. Education 98/198B is a recommended elective.

Students who wish to participate in the program should consult the chair of the History Department at an early date.

WORLD AND COMPARATIVE HISTORY

25. 20th-Century World Wars

A study of the causes, conduct, and results of World Wars I and II and their place in modern history. Civilian and military leadership and the chief campaigns and battles. (May also count as European History.)

26. Modern Revolutions

Comparative study of the causes, successes, and failures of selected revolutions and rebellions. Emphasis on revolutionary leadership, ideology, and organization.

101. Historical Interpretation

An investigation of the art and science of the craft of history through an examination of the ways in which historical events have been interpreted by diverse historiographical methods.

102. History of the Jesuits, 1491–1992

An interdisciplinary examination of the evolution of the Society of Jesus from its founding at the close of the Middle Ages to the present. An exploration of how the order has been, and continues to be, con-

stantly shaped and molded by external secular and ecclesiastical influences. (May also count as European or U.S. history.) (Also listed as Religious Studies 116.)

103. Technology and Imperialism Seminar

Examination of the relationship between the development of technologies and imperial organization. Emphasis on the application of technologies to imperial expansion and control during the 19th and 20th centuries and how imperialism has contributed to the rise of new technologies.

104. War in World History to 1815

War in Western civilization from Greek and Roman antiquity to the French Revolution and Napoleon. Complex relationships among war, politics, values, social structures, economics, and geography. Battles and great commanders. War in thought, literature, and art.

105. War in the Modern World

War from the era of the French Revolution to the post–World War II period. Focus on the complex problems and conflicts of expansive nation-states in an age of unprecedented economic growth and technological innovation. Grand strategy, high command, and military and naval campaigns. Shifting attitudes of the modern mind facing the phenomenon of war.

109. African Americans and Africa[§]

Historical examination of the roots of African American culture and politics: the impact of the Atlantic slave and the continuity of the influence of African cultures.

190. Seminar in World or Comparative History

Original research and group discussions of selected problems and periods.

199. Directed Reading/Directed Research

Directed reading and research in source materials and secondary works dealing with selected historical problems in world and comparative history. *Prerequisite: permission of department chair and instructor.*

U.S. HISTORY

7. United States: Colonies and Constitution

Introductory survey of U.S. history from first European settlement through the Constitutional Convention. Political, economic, social, and intellectual aspects of America's first 200 years.

8. United States: The 19th Century

Introductory survey of U.S. history from the Constitutional Convention to the Spanish American War. Political, economic, social, and intellectual aspects of the century that saw the nation evolve from an infant state to an industrial world power.

9. United States: The 20th Century

Introductory survey of U.S. history from the Spanish American War to the present. Political, economic, social, and intellectual aspects of America in an era of international involvement and domestic change.

77H. Honors Seminar: United States

Selected problems in U.S. history. Methods of the historian. Restricted to University Honors Program students.

[§] Course included in Ethnic Studies program

81. Chicanos in the Southwest[§]

Survey of the Chicanos in California and the Southwest. Emphasis on the period since 1848 and on Texas, New Mexico, and California.

83. Asian Americans[§]

Survey of Asians in Hawaii and the West Coast to about World War II. Pre-colonial Hawaii, imperialism in the Pacific, Asian contract and migrant labor, the anti-Asian movement, Asian American communities, and World War II.

100. Historical Writing

Researching and writing history papers. Required of all majors in last quarter sophomore year or first quarter junior year.

170. The American Colonies

Development of religious, political, economic, and social institutions in England's North American colonies in the 17th and 18th centuries.

171. Revolution, Confederation, Constitution

Intensive study of the origins, progress, and culmination of the American Revolution to 1800.

172. The New Nation

Social and political reforms, expansion and changes, sectional and national politics of the United States between 1800 and 1850.

173. The Union in Crisis

Intensive study of the Old South from the Revolution to the Civil War and Reconstruction. Emphasis on regional identity, race, and the relationship of Southern history to the national experience.

174. Industrialism and Reform: 1877–1920

Growth of industrial America in the age of immigration. Populist response to the growth of urban power and attempts by Progressives to moderate the impact of big business. U.S. involvement in World War I.

175. The Modern Era: 1920–1960

The end of the Republican ascendancy in the 1920s and the rise of the New Deal coalition. America at war again and the Cold War at home and abroad.

176. America in the 1960s

Little Rock to Watergate: social, political, and foreign policy upheavals of the 1960s. Civil rights movement, student and anti-war movements, hippies and others, Kennedy and Johnson, end of the Cold War and the Vietnam War, Nixon and Watergate.

177. American Capitalism

Analysis of the philosophy and social impact of the capitalist idea as it developed in America from the colonial period to the 20th century. Role of the businessperson, social mobility, and some anti-capitalist ideas.

178. 20th-Century U.S. Diplomatic History

Critical study of U.S. international relations. Economic, political, social, and public opinion forces influencing the development of U.S. policy.

179. Special Topics in U.S. History

Occasional lecture courses in special topics in U.S. history.

181. U.S. Catholicism

The Catholic experience in America from colonial times to the present. Missions among the Indians, the English colonies,

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§ Course included in Ethnic Studies program

the church of the immigrants, the parish and local church, the Catholic response to industrialization, the Second Vatican Council.

182. Family in U.S. History‡

History of the family in the United States from the 17th to the 20th century. Impact of changing society on the family from birth to death. Particular focus on life stages, child rearing, and sexuality.

183. Social Movements in 20th-Century America

Popular movements for and against change. Investigation of the response of the American people to the problems of modern industrial society. Labor, women's rights, black activism, anti-radicalism, Ku Klux Klan, peace movement, and others.

184. Women in American Society‡

Historical survey of women's experiences from the Puritan era to the present. Emphasis on class, race, and ethnic origins, and activist roles of women.

185. Native Americans of the United States§

History of Native Americans of the United States from European contact to the present. Emphasis on 19th- and 20th-century developments.

187. The American West

The West as a factor in U.S. history, from the 17th century to the present. Emphasis on the 19th-century trans-Mississippi frontier.

189. California

Survey of the state's history: its Native American origins, Spanish invasion and missionization, Mexican period, U.S. conquest, gold rush, and development to the present. Major attention to the 19th century.

197. Seminar in U.S. History

Original research and group discussions of selected problems and periods.

199. Directed Reading/Directed Research

Directed reading and research in source materials and secondary works dealing with selected historical problems in U.S. history. *Prerequisite: permission of department chair and instructor.*

EUROPEAN HISTORY

11. Western Civilization: Ancient

Interdisciplinary survey of the development of Western culture from the Near Eastern origins of Western civilization through the collapse of the Roman Empire. May be taken to fulfill one part of the Western Culture requirement. Open to all students.

12. Western Civilization: Medieval and Early Modern

Interdisciplinary survey of the development of Western culture from the fall of the Roman Empire to the age of Louis XIV. May be taken to fulfill one part of the Western Culture requirement. Open to all students.

‡ Course included in Women's Studies program § Course included in Ethnic Studies program

13. Western Civilization: Modern

Interdisciplinary survey of the development of Western culture from 1715 to the present. May be taken to fulfill one part of the Western Culture requirement. Open to all students.

16. Ancient Greek and Roman Religion

Pagan religious culture in the Classical Mediterranean world. Consideration of the differing religious attitudes and expectations of polytheisms and monotheisms and of religious expression in the context of cult and ritual. (Also listed as Classics 66 and Religious Studies 51.)

110. Ancient Greece

A survey of Hellenic history from the Bronze Age to Alexander the Great. Emphasis on the rise and fall of the polis as an independent social, cultural, and political community. (Also listed as Classics 110.)

111. Hellenistic Age and the Rise of Rome

The Hellenistic world and Alexander the Great's successors. Rome from its origins to its conquest of the Mediterranean and Gaul. The collapse of the Roman Republic; establishment of the Principate. (Also listed as Classics 111.)

112. Roman Empire

A political, social, and cultural survey of the Roman Empire beginning with Augustus and tracing changes in Rome from the development of the Roman Empire as a world state to the development of Christianity as a world religion. (Also listed as Classics 112.)

113. Eastern Roman (Byzantine) Empire

An examination of the later Roman (Byzantine) Empire (A.D. 313–1453) and its important role in preserving and transmitting the Greco-Roman tradition and acting as the conduit for cultural, religious, and economic exchange between the East and the West.

114. Family in Antiquity

A survey of family social, economic, political, and religious roles in various ancient Greek states and in Republican and Imperial Rome. (Also listed as Classics 186.)

115. Greek and Roman Historiography

A survey of the origin and development of historical prose from Herodotus through Ammianus Marcellinus. Consideration of history as an artistic genre; special attention to the authors' various political and ideological purposes. (Also listed as Classics 183.)

116. The World of St. Augustine

An examination of the emergence of the world of late antiquity by centering on the life of one man who, in many ways, was the embodiment of the continuity and change that shaped that culture. (Also listed as Religious Studies 169.)

117. Western Barbarians: 300–1100

A social and cultural survey of Western Europe from the first appearance of the barbarians on the borders of the Roman Empire to the 12th-century renaissance. The fall of Rome, the survival of ancient culture, the emergence of feudalism, the roots of modern social and intellectual structures.

118. Crusading Age: 1000–1450

The culture and society of the High Middle Ages, from its emergence in the 11th century to its dissolution in the 15th century. The 12th-century renaissance, the crusades and the idea of Christendom, the origins of modern governmental and economic concepts, Gothic art, and courtly love.

119. Renaissance and Reformation: Europe, 1350–1560

The transformation of Europe from a medieval to a modern society. The Italian and Northern renaissances, the formation of the early modern state, dynastic struggles and overseas expansion, the Protestant Reformation and the Catholic response. Cultural, artistic, and intellectual developments.

120. Dynasties and Discoveries: Europe, 1560–1763

Empires, warfare, and the growth of the early modern state. Culture and thought in the Age of Scientific Revolution and Enlightenment.

121. Special Topics in Ancient and Medieval Europe

Occasional lecture courses in selected topics in ancient and medieval Europe.

122. State and Church in the Middle Ages: 1000–1450

The struggles between state and church that formed modern Western political institutions. The rise of royal and papal theocracy, the emergence of the idea of limited government, the foundation of representative institutions and modern legal institutions, the origins of the modern state. (Also listed as Religious Studies 121.)

123. Late Medieval Religion

Christian religious culture from the feudal age to the Reformation. The influence of the new urban society on religious observance, the rise of the papacy, the mendicants, struggles with nation states, the Great Schism, conciliarism, movements for reform.

124. Pilgrimage in Western Europe

An exploration of the many facets of Christian pilgrimage, from its roots in the pre-Christian world through the High Middle Ages in Western Europe. Pilgrimage examined as a complex institution that impinged upon many aspects of medieval life and culture. (Also listed as Religious Studies 186.)

125. Medieval European Women‡

An examination of the ways society's constructs of power and control affected medieval women's lives and the ways in which women affected society. Focus on marriage and the family, the Church, public power and authority, the economy, and sex and love.

126. Western Europe and the World Since 1919

The intersection of society, politics, and culture during the post–World War I inflation and the Great Depression; the rise of fascism in Italy and Germany, the Spanish Civil War, World War II and the holocaust; decolonization, prosperity, and the rise of mass culture in the 1950s; the revolt of youth in the 1960s; economic recession in the 1970s; and the consolidation of a united Europe in the 1980s. (May also count as World and Comparative History.)

127. Women in Europe‡

Survey of the changing social experience, cultural images, and political position of European women from the medieval period to the present. Examination of the role of women in bringing about change.

128. European Diplomatic History

Relations of major European powers since 1870. Emphasis on economic, political, and social forces that influenced these relations.

129. European Culture and Society

Brief introduction to European culture and civilization from the end of the Middle Ages to the beginning of the 20th century. Emphasis on cultural forms, letters,

‡ Course included in Women's Studies program

the fine arts and music, and social developments.

130, 131. Germany

Social, economic, political, and cultural development of the German nation—128: Germany from the Reformation to 1848; 129: Germany from 1848 to the Third Reich.

132. Ireland

Irish history since the Reformation. Emphasis on conflict between the Protestant Ascendancy and the Catholic population. The modern division of Ireland.

133, 134. England

Growth of the English state and constitution. Continental ambitions of England during the Middle Ages. Tudors and the English reformation; constitutional struggle under the Stuart monarchs; development of modern English government; 19th-century political reforms; Britain's role in the modern world.

135. Spain

The peoples of Spain from earliest times to the present. Emphasis on period from Ferdinand and Isabella to the late 17th century (*Siglo de Oro*) and to the crises of 20th-century Spain.

136, 137. Russia

Political, social, and religious formation of early Russia; the reforms of Peter the Great; Russian absolutism and the impact of Western Europe in the 18th and 19th centuries; Russian Revolution; economic and political developments in the Soviet Union.

138. Contemporary Central and Eastern Europe

Ethnic and historic background of modern Poland, Czechoslovakia, Hungary, Romania, Bulgaria, and Yugoslavia. Effects of World Wars I and II. Destruction of postwar democracies, political and economic Stalinization. De-Stalinization after 1953, failure of reforms, the 1956 and 1989 revolutions. Current economic prospects and sources of future tensions and conflicts.

139. Special Topics in Modern Europe

Occasional lecture courses in selected topics in modern Europe.

191. Seminar in Ancient History

Original research and group discussions of selected problems and periods.

192. Seminar in Medieval or Early Modern Europe

Original research and group discussions of selected problems and periods.

193. Seminar in Modern Europe

Original research and group discussions of selected problems and periods.

199. Directed Reading/Directed Research

Directed reading and research in source materials and secondary works dealing with selected historical problems in European history. *Prerequisite: permission of department chair and instructor.*

AFRICAN HISTORY

45. Introduction to African History and Cultures

Historical survey of the origins and development of African cultures from ancient times to the onset of European colonialism in the 19th century. Focus on selected civilizations and societies. Patterns of African social, economic, and political life.

140. Origins and Development of Islam

Prophethood of Muhammed and the Muslim revolution. Islamic conquests and formation of Muslim institutions. Development of philosophy, law, and art during the "golden age" of Islam. Fragmentation of the Muslim empire; the rise of Turkish power; the Crusades.

141. Modern Middle East and North Africa

European imperialism and the development of Arab nationalism. Problems of economic development, political stability, and military conflict.

144. Women in Islamic and African Societies‡

Comparative analysis of the legal position of women and their social, economic, and political roles in different African and Middle Eastern cultural settings.

146. Colonial Africa

African institutions and culture in the imperial era, the rise of nationalism, the effects of social and economic change.

147. Independent Africa

African economic, social, and political problems after independence. Major ideologies and international conflict.

149. Special Topics in African History

Occasional lecture courses in special topics in African history.

194. Seminar in African History

Original research and group discussion of selected problems and periods.

199. Directed Reading/Directed Research

Directed reading and research in source materials and secondary works dealing with selected historical problems in African history. *Prerequisite: permission of department chair and instructor.*

EAST ASIAN HISTORY

50. Introduction to East Asian Studies

A study of the emergence of modern nations from the rich and diverse cultures of the Pacific and the mutual transformations of East Asia, Europe, and America in the past century. An examination of the linkages within the region and with other regions using concepts borrowed from anthropology, economics, and political science.

51. Introduction to Chinese Civilization

History and culture from the dawn of civilization to the post-Maoist present. Ancient philosophies. Confucianism, traditional political institutions, urbanization, the impact of the West, 20th-century reform and revolution. Modern society, politics, and economics.

52. Introduction to Japanese Civilization

Two thousand years of Japanese history and culture. Age of classical civilization, feudalism and shogunal government, 19th-century modernization, imperialism. War in the 20th century. Postwar social and economic successes.

151. Premodern China

Chinese civilization from the earliest times to the Western intrusion. Dominant

‡ Course included in Women's Studies program

historical and cultural patterns; evolution of Confucianism, Taoism, and Buddhism; development of political institutions; analysis of preindustrial economic experience; state-society relations.

152. Modern China

Analysis of 19th- and 20th-century revolutionary changes. Equal emphasis on the disintegration of imperial rule and the efforts of 20th-century revolutionaries. Intellectual and cultural changes and the roles of the West. Indigenous forces shaping China's modern evolution.

154. Women in Asia‡

Gender as a historical category in analyzing the impact of change in East Asia from the traditional to the modern period. Changing roles and status of women under industrialization, intellectual development, and legal reform.

155. Imperialism in East Asia

Social, political, and economic effects of imperialism in China, Korea, and Vietnam in the 19th and 20th centuries; colonialism and dependency and their application to East Asia.

156. Medieval and Early Modern Japan

From prehistoric times to the mid-19th century. Japan's adaptation of Chinese civilization; cultural and literary history; political effects of socioeconomic changes from the classical period through feudalism to interaction with the West; ideological developments and response to Western encroachment.

157. Modern Japan

Major themes in Japanese modern history since 1868. Japan's 19th-century "economic miracle"; problems faced by a rapidly modernizing agrarian economy; nationalism and imperialism and their effects on foreign policy; adaptation of Western ideals and institutions; social and political movements in the 20th century, especially the suffrage and labor movements; postwar reconstruction.

158. U.S.-Japan Relations

The two Pacific powers: their initial gunboat encounter in 1853; the rise of imperialism; rivalry for influence in East Asia. The Pacific War and its aftermath. Contemporary trade and security issues.

159. Special Topics in Asian History

Occasional lecture courses in special topics in Asian history.

195. Seminar in Asian History

Original research and group discussion of selected problems and periods.

199. Directed Reading/Directed Research

Directed reading and research in source materials and secondary works dealing with selected historical problems in Asian history. *Prerequisite: permission of department chair and instructor.*

LATIN AMERICAN HISTORY

61. Latin America: Indians and Conquerors

Introduction to Latin American culture and civilization from the Native American empires, through the Iberian conquest, to the independence of Latin American nations.

62. Modern Latin America

Introduction to Latin American history focusing on the formation of 19th-century nations and the forces shaping their 20th-century experience.

‡ Course included in Women's Studies program

64. Central America

Survey of Central America from independence to the present. Focus on three Central American countries: Nicaragua, Guatemala, and El Salvador. Emphasis on recent developments; social, economic, and political problems (militarism, dictatorship); and the nature of U.S. policy vis-à-vis Central America.

161. Mexico: Colonial and Early National Periods

Mexico from the Mayas and Aztecs to the Benito Juarez era in the 1870s. The Indian past, the Spanish conquest, and independence to Juarez's La Reforma.

162. Modern Mexico

Mexico since the Benito Juarez regime to the present. Emphasis on the Porfiriato, the 1910 Revolution and its institutionalization, and the development of the modern state.

163. Contemporary Latin America

A thematic introduction of the political and economic dynamics shaping 20th-century Latin America. Political and economic dynamism, revolution, authoritarianism, popular aspirations, and current trends and prospects.

165. Argentina

The political and economic development of this southern South American nation from the late 18th century to the present, with emphasis on 19th-century gaucho leaders and liberalism, and also on 20th-century democracy, militarism, and Peronism.

166. Cuba and the Caribbean

A survey from the colonial period to the present of three Caribbean nations: Cuba, the Dominican Republic, and Puerto Rico. Emphasis on 20th-century developments; social, economic, and political issues (dictatorship, revolution, social stratification); and the role of U.S. policy vis-à-vis Cuba and the Caribbean.

167. Brazil

Analytical study of Brazil's past and present: the colonial era, the New World monarchies of Pedro I and II, and the republic. Emphasis on social and economic developments.

168. U.S. and Latin American Relations

Analysis of the political, economic, and social relations between the United States and Latin America. Case studies of major issues and events involving U.S. policy in Latin America. Emphasis on 20th-century and recent developments.

169. Special Topics in Latin American History

Occasional lecture courses in special topics in Latin American history.

196. Seminar in Latin American History

Original research and group discussion of selected problems and periods.

199. Directed Reading/Directed Research

Directed reading and research in source materials and secondary works dealing with selected historical problems in Latin American history. *Prerequisite: permission of department chair and instructor.*

INDIVIDUAL STUDIES

An individual studies major has been established to meet the needs of students who wish to design a course of studies with a multidisciplinary perspective.

REQUIREMENTS FOR MAJOR

Students who wish to be admitted to the program as a candidate for the degree of Bachelor of Arts or Bachelor of Science in Individual Studies must

1. be a full-time student at Santa Clara for at least one year;
2. have fewer than 111 quarter units of academic work completed at the time of application;
3. have a minimum 3.0 grade point average; and
4. submit a Petition for Admission to the program coordinator for review and approval.

The student petition should include

1. a clear, logical, and conceptually refined description of the proposed program;
2. a well-developed argument, supported by appropriate evidence, showing that no existing academic major can meet the student's educational objectives; and
3. a plan of study by academic quarter, listing courses, seminars, internships, etc., which corresponds to the student's educational objectives and fulfills the requirements of the University Curriculum.

The coordinator of the Individual Studies program is Dr. William J. Prior, Department of Philosophy.

LIBERAL STUDIES

Program Coordinator: Patricia J. Bendigkeit (Communication)
Program Council: Cedric U. Busette (Modern Languages), Timothy J. Lukes (Political Science), Jean J. Pedersen (Mathematics), Lois C. Rosenthal (Chemistry), Carol G. Rossi (English), Carol J. White (Philosophy), Eleanor W. Willemsen (Psychology)

The liberal studies major (formerly multidisciplinary studies/pre-teaching) is designed for undergraduates interested in a career in elementary school teaching or students seeking a broad background in the liberal arts and sciences. The Liberal Studies program is approved by the California State Commission on Teacher Credentialing as an alternative to completing the Multiple-Subject Assessment for Teachers (MSAT). Completion of the liberal studies major exempts individuals seeking a teaching credential for the elementary level from taking the MSAT, but the credential itself requires a fifth year of study. Santa Clara's graduate Division

of Counseling Psychology and Education offers the credential program. (See Section 8 for further details.)

The Liberal Studies program was developed by a faculty committee representing the social sciences, mathematics, natural sciences, and the humanities in consultation with faculty from the Division of Counseling Psychology and Education. The curriculum encourages critical thinking, sensitivity to human values and ethical principles, and a respect for and appreciation of diverse cultures. By learning how to learn, its students prepare themselves to understand a constantly changing and challenging world.

REQUIREMENTS FOR MAJOR

Students should declare a major in liberal studies by the end of their freshman year and must complete at least 14 upper-division courses. A 2.6 GPA is required for admission to the program; all required courses in the major must be passed with at least a grade of C- or be repeated or substituted.

The liberal studies major requires (1) a common program of study that provides the foundation for the breadth of subjects taught in elementary school and (2) an in-depth study in one area or discipline, which may be achieved through either the completion of the programs designated below as Concentrations or a major in another field. If a student chooses a second major, some of the required courses in that major may substitute for some of the following breadth requirements. In addition to the breadth requirements, all students are strongly encouraged to take English 180 (Writing for Teachers) and Communication 20 (Public Speaking).

Because of the complexity of the program, students are assigned two advisers, one for the liberal studies major and one from the discipline they study as a concentration or second major.

Breadth Requirements

Many of the following courses required for the major also fulfill University Curriculum or College of Arts and Sciences requirements.

1. Language Arts
   a. English 1 and 2 (Composition and Rhetoric I and II); 11 (Western Culture: Literature I); 101 (Linguistics); and one upper-division literature course that meets the University Curriculum requirement for a third composition course
   b. Foreign language: completion of three quarters in one language or equivalent proficiency, which may be achieved in high school
2. Mathematics and Natural Science
   a. Math 4 and 5 (Mathematics for Elementary Teachers I and II); Math 7 (Calculus for Social Science); Math 41 (Nature of Mathematics)
   b. Two physics courses, including Physics 51 (Introduction to Earth Science); one biology course; and one chemistry course

3. History and Social Science
   a. One history course selected from History 7 (United States: Colonies and Constitution); History 8 (United States: The 19th Century); or History 171 (Revolution, Confederation, Constitution)
   b. One economics course
   c. Political Science 50 (World Geography)
   d. One course that meets the Ethnic Studies requirement and one that meets the Women's Studies requirement, one of which must be taken in political science
4. Humanities
   a. Three religious studies courses: one introductory level, one intermediate level, and one upper-division course (advanced level) taken after achieving junior status
   b. Art History 11, 12, and 13 (the sequence fulfilling the Western Culture requirement)
   c. One ethics course in the Philosophy Department
   d. One visual arts course selected from Art 10 (Introduction to Studio Art) or a drawing or painting course
   e. One music course selected from Music 30 (Beginning Piano), 32 (Beginning Guitar), 51 (Musicianship I), or 70 (Introduction to Music)
5. Child Development
   a. Psychology 185 and 186 (Developmental Psychology I and II)
   b. Liberal Studies 70 (Movement for Children)
   c. Education 98/198 (Introduction to Elementary School Teaching: Practicum)
   d. Education 138 (The Exceptional Child). Education 163 (Introduction to Teaching in a Multicultural Society) may be substituted for 138 if 163 contains a unit on special education.
6. Liberal Studies 198 (Senior Seminar)

Concentrations

The following areas offer concentrations or in-depth study in one subject: English, mathematics, general science, biology, chemistry, physics, general social science, anthropology, economics, history, political science, psychology, sociology, art, classics, communication, dance, French, German, Italian, Japanese, Spanish, music, philosophy, religious studies, theatre, ethnic studies, international studies, and women's studies.

For course requirements for the concentrations or for information about modified breadth requirements related to specific second majors, contact the program coordinator, Patricia Bendigkeit, Department of Communication.

LIBERAL STUDIES COURSES

70. Movement for Children

Examination of the contribution of physical movement and skill development to the learning abilities of children. Interaction of physical, social, cognitive, and motor learning.

198. Senior Seminar

Integration of methodological, epistemological, and criteriological features distinctive to the humanities, social sciences, and physical sciences using collaborative research methods. Examination of an issue of concern to U.S. elementary and secondary education. Open only to senior liberal studies majors who have completed all other program requirements or are enrolled concurrently in courses that will complete those requirements.

DEPARTMENT OF MATHEMATICS

Professor Emeritus: Karel L. de Bouvère, SCJ
Professors: Gerald L. Alexanderson *(Chair),* Paul R. Halmos
Associate Professors: José Barría, Robert A. Bekes, Frank A. Farris, Leonard F. Klosinski, Jean J. Pedersen, Dennis C. Smolarski, S.J.
Assistant Professors: Steven R. Benson, Edward F. Schaefer, Alan Evan Wessel, S. Tamsen Whitehead
Senior Lecturer: Alice J. Kelly
Lecturer: Peter Ross
Michael and Elizabeth Valeriote Professor: Gerald L. Alexanderson

The Department of Mathematics offers major programs leading to the Bachelor of Science in Mathematics or the Bachelor of Science in Computer Science (Mathematics), as well as required and elective courses for students majoring in other fields. Either major may be pursued with any of three principal goals: preparation for graduate studies leading to advanced degrees in mathematics, computer science, statistics, operations research, or other fields; preparation for secondary school teaching of mathematics or computer science; or preparation for a career in research in industry or government. The major in mathematics may be taken with an emphasis in computer science or in mathematical economics. Minors in mathematics or computer science are also available.

Graduate work is offered in the department for the Master of Science in the Teaching of Mathematics degree; for a description of this degree, contact the Department of Mathematics. For a description of the Master of Science in Applied Mathematics degree offered by the School of Engineering, see the *School of Engineering Graduate Programs* bulletin.

Students interested in careers in secondary education in mathematics should consult with the department chair early in their academic program.

REQUIREMENTS FOR MAJOR AND MINOR

Bachelor of Science Degree in Mathematics

In addition to completing the University Curriculum and College requirements for the Bachelor of Science degree, candidates for the B.S. in Mathematics must complete the following requirements:

1. Mathematics 11, 12, 13, 21, 52, and 53
2. Seven upper-division courses in mathematics, two of which must be Mathematics 102 and either 111 or 176 (or both). Mathematics 111 should be taken by students planning to do graduate work in mathematics; 176 is more suitable for students planning work in computer science or other applied areas. Students planning to undertake graduate studies in mathematics should plan to take, in addition to 102 and 111, Mathematics 105, 112, 113, 144, and 154.
3. Mathematics majors must demonstrate the ability to read a mathematical work in French, German, or Russian prior to graduation.
4. Physics 4 and 5 (Physics for Scientists and Engineers I and II). Students with a special interest in the application of mathematics in the social sciences or economics may substitute Economics 170, 171, or 177 for Physics 5. Students planning to teach in secondary schools may substitute, with approval of the department chair, Physics 20 and 21 (General Physics I and II) for Physics 4 and 5.

Students electing the B.S. in Mathematics with emphasis in Computer Science should take Mathematics 10 and 61, COEN 22, and at least four of the following: Mathematics 122, 123, 144, 154, 161, 162, 163, 164, 165, 166, 167, 168, 169, 176, and 177. Mathematics 22 and 32 are recommended.

Bachelor of Science Degree in Computer Science (Mathematics)

In addition to completing University and College requirements for the Bachelor of Science degree, candidates for the B.S. in Computer Science (Mathematics) must complete the following courses:

1. Mathematics 10, 11, 12, 13, 21, 22, 32, 52, 53, 61, and 163
2. One course chosen from Mathematics 161, 166, or 167
3. One upper-division mathematics course on the following list and two upper-division mathematics courses not on the list: Mathematics 144, 161, 162, 164, 165, 166, 167, 168, 169, 176, and 177
4. Physics 4 and 5 (Physics for Scientists and Engineers I and II)
5. COEN 22 and 121 and one additional COEN upper-division course

Minor in Mathematics or Computer Science

The minor in mathematics requires completion of Mathematics 11, 12, 13, 21; 52 or 53; and three upper-division courses with no more than one course selected from 161–169.

The minor in computer science requires completion of Mathematics 10 and 61; 12, 32, or 51; COEN 22; three courses selected from 144, 161–169, and 176–177; and either COEN 121 or Math 167.

EMPHASIS IN MATHEMATICAL ECONOMICS

The Mathematics and Economics departments jointly offer a program providing an emphasis in mathematical economics. Students wishing to participate major in either mathematics or economics but pursue a course of study that emphasizes the use of mathematics in the study of economics. Participation in the program is noted on the student's transcript. This program is especially suited for students planning graduate work or careers in mathematical economics, actuarial science, operations research, or related fields. All students in the program must complete the following in addition to University and College requirements as well as specific requirements in their major departments:

1. Economics 114, 115, 170, 171, and 177
2. Mathematics 21, 22, 52, 53, and 102
3. Mathematics 122, 123, or Economics 174

Full descriptions of the program may be obtained from the chair of the Economics or the Mathematics Department.

HONORS PROGRAM

The Department of Mathematics maintains a program for the discovery, encouragement, and development of mathematical talent among undergraduates. This program includes special sections, seminars, individual conferences, and directed study guided by selected faculty members. Students are also encouraged to participate actively in research projects directed by faculty.

LOWER-DIVISION COURSES

Note: A grade of D in a prerequisite course in the calculus sequences (Math 11–21; Math 30–31) indicates a student is not adequately prepared for further work based on that course material. Students who receive a grade of D in the prerequisite course are therefore strongly advised not to continue with the next course until they have successfully mastered the prerequisite material. For further information, consult the Mathematics faculty.

For courses that charge fees, see the quarterly Class Schedule.

4. Mathematics for Elementary Teachers I

Problem solving and logical thinking approach to whole numbers: their nature, counting, place value, computational operations, properties, and patterns. Intuitive two-dimensional geometry and measurement, especially metric. Does not fulfill the University Curriculum requirement. NCX†

† Exempted from challenge

5. Mathematics for Elementary Teachers II

Problem solving and logical thinking approach to fractional numbers, integers, rational numbers and real numbers: their nature, computational operations, properties, and patterns. Intuitive three-dimensional geometry and measurement, especially metric. Functions, relations, and graphs. Does not fulfill the University Curriculum requirement. *Prerequisite: Math 4 recommended but not required.* NCX†

6. Finite Mathematics for Social Science

Introduction to finite mathematics with applications to the social sciences. Sets, logic, combinatorial problems, probability, vectors, and matrices.

7. Calculus for Social Science

Introduction to differential and integral calculus with applications to the social sciences. Math 7 and 11 cannot both be taken for credit.

8. Introduction to Statistics

Elementary topics in statistics chosen from descriptive statistics, probability, random variables and distributions, sampling, estimation, hypothesis testing, regression, and correlation. *Prerequisite: Math 6 or equivalent.*

9. Precalculus

College algebra and trigonometry, for students who wish to take calculus. Does not fulfill the University Curriculum requirement. *Prerequisite: permission to enroll from department chair.* (2 units)

10. Introduction to Computer Science

Introduction to computer science and programming. Structured programming techniques using Pascal and FORTRAN, machine structure, elementary algorithms, and data structures. Primarily (but not exclusively) for majors in computer science, mathematics, and physical sciences. Math 10 may not be taken for credit if student has received credit for a course in Pascal or FORTRAN (e.g., COEN 4, DISC 30). *Prerequisite: Math 11 (may be taken concurrently).*

11. Calculus and Analytic Geometry I

Differentiation and applications, introduction to integration. Math 7 and 11 cannot both be taken for credit. *Prerequisite: four years of high school mathematics (including trigonometry) or satisfactory grade in Math 9.*

12. Calculus and Analytic Geometry II

Continuation of 11. Methods and applications of integration, transcendental functions. *Prerequisite: Math 11.*

13. Calculus and Analytic Geometry III

Polar coordinates, parametric equations, infinite series, determinants, vectors. *Prerequisite: Math 12.*

21. Calculus and Analytic Geometry IV

Vector functions, partial derivatives, multiple integrals, line integrals, Green's theorem. *Prerequisite: Math 13.*

22. Differential Equations

Use of series, numerical, and Laplace transform methods in solving differential equations. Applications. *Prerequisite: Math 21.*

30. Calculus for Business I

Differentiation and its applications to business, including marginal cost and profit, maximization of revenue, profit,

† Exempted from challenge

utility, and cost minimization. Natural logarithms and exponential functions and their applications, including compound interest and elasticity of demand. Study of the theory of the derivative normally included in Math 11, except trigonometric functions not included here. *Prerequisite: three years of high school mathematics (excluding trigonometry) or satisfactory grade in Math 9.* (Math 30 is not a prerequisite for Math 12.)

31. Calculus for Business II

Integration and its applications to business, including consumer surplus and present value of future income. Functions of several variables and their derivatives; Lagrange multipliers and constrained optimization. Emphasis throughout the sequence on mathematical modeling, the formulation of practical problems in mathematical terms. *Prerequisite: Math 30.*

32. Mathematical Logic

Informal and formal methods in elementary logic. Arithmetical representations of statement calculus. Boolean algebras of sets, statements, and electrical switches. For students in computer science and/or students planning to pursue further work in logic and foundations. Recommended prerequisite for Math 133.

41. The Nature of Mathematics

For liberal arts students. Topics chosen from the theory of numbers, combinatorics, geometry, and other suitable areas. Material will generally be presented in a historical setting that allows students to participate in the discovery and development of important mathematical ideas. Emphasis on problem solving and *doing* mathematics.

51. Discrete Mathematics

Relations and operations on sets, orderings, elementary combinatorial analysis, recursion, algebraic structures, graphs. (Also listed as COEN 79.)

52. Introduction to Abstract Algebra

Groups, homomorphisms, isomorphisms, quotient groups, fields, integral domains, and applications to number theory.

53. Linear Algebra

Vector spaces, linear transformations, algebra of matrices, eigenvalues and eigenvectors, and inner products. *Prerequisite: Math 13.*

61. Data Structures

Analysis of structures used for computer data storage (arrays, records, stacks, queues, linked lists, trees). Introduction to algorithms associated with various data types (sorting, searching, tree traversal, large integer arithmetic), and to general programming techniques (recursion, iteration). Math 61 and COEN 70 cannot both be taken for credit. *Prerequisite: Math 10.*

90. Lower-Division Seminars

Basic techniques of problem solving. Topics in algebra, geometry, and analysis.

UPPER-DIVISION COURSES

Note: Although Mathematics 10 is not explicitly listed as a formal prerequisite, some upper-division courses suggested for computer science (mathematics) majors may presuppose the ability to write computer programs in some language. A number of upper-division courses do not have specific prerequisites. Students planning to enroll should be aware, however, that all upper-division courses in mathematics require some level of mathematical maturity. Those without a reasonable background in lower-division courses are advised to check with instructors before enrolling.

For courses that charge fees, see the quarterly Class Schedule.

101. A Survey of Geometry

Topics from projective, advanced Euclidean, and non-Euclidean geometries. Convex sets. Offered in alternate years.

102. Advanced Calculus

Vector calculus, functions of several variables, elliptic integrals, line integrals, uniform convergence, Stokes's theorem, and the divergence theorem. *Prerequisites: Math 21 and 53.*

105. Theory of Functions of a Complex Variable

Analytic functions. Cauchy integral theorems, power series, conformal mapping. Riemann surfaces.

111. Abstract Algebra I

Topics from the theory of groups. Offered in alternate years. *Prerequisites: Math 52 and 53.*

112. Abstract Algebra II

Rings and ideals, algebraic extensions of fields, and the Galois theory. Offered in alternate years. *Prerequisite: Math 111.*

113. Topology

Pertinent set theory. Topological spaces, continuous functions, product spaces. Separability and compactness. Metric spaces and metric topologies. Offered in alternate years. *Prerequisite: Math 52 or 53 or 102.*

122. Probability and Statistics I

Kolmogorov's axioms; conditional probability; independence; random variables; discrete and continuous probability distributions; expectation; moment-generating functions; weak law of large numbers; central limit theorem. *Prerequisite: Math 21.*

123. Probability and Statistics II

Estimation and hypothesis testing. Maximum likelihood estimation, likelihood ratio tests, and sampling from the normal distribution. Applications. *Prerequisite: Math 122.*

133. Logic and Foundations

Deductive theories. Theories and models. Consistency, completeness, decidability. Theory of models. Cardinality of models. Some related topics of metamathematics and foundations. Open to upper-division science and mathematics students and to philosophy majors having sufficient logical background. Offered in alternate years. *Prerequisite: Math 32 or equivalent.*

134. Set Theory

Naive set theory. Cardinal and ordinal arithmetic. Axiom of choice and continuum hypothesis. Axiomatic set theory. Offered in alternate years.

144. Partial Differential Equations

Special topics in higher mathematics useful in applications to the physical sciences, such as special functions of mathe-

matical physics. Fourier series, partial differential equations, and boundary value problems. Offered in alternate years. *Prerequisite: Math 22.*

153. Intermediate Analysis I

Rigorous investigation of the real number system. Concepts of limit, continuity, differentiability of functions of one real variable, and theorems of differential and integral calculus. Offered in alternate years. *Prerequisite: Math 102.*

154. Intermediate Analysis II

Continuation of Mathematics 153. Offered in alternate years.

155. Ordinary Differential Equations

Existence and nature of solutions, oscillation theory, orthogonal functions, partial differential equations. Offered in alternate years. *Prerequisite: Math 102.*

161. Theory of Automata and Languages I

Classification of automata, formal languages, and grammars. Chomsky hierarchy. Representation of automata and grammars, BNF. Deterministic and nondeterministic finite state automata. Regular expressions and languages. Push-down automata. Context-free languages. Offered in alternate years. *Prerequisites: Math 52 and 61 or equivalent.*

162. Theory of Automata and Languages II

Turing Machines. The Halting Problem. Universal Turing Machines. Undecidability. Normal forms and grammar transformations. Top-down and bottom-up parsing and the relation to compilers. LL and LR grammars. Selected topics (e.g., recursive functions, Gödel numbers, Post correspondence problem). Offered in alternate years. *Prerequisite: Math 161.*

163. Theory of Algorithms

Preliminaries: measuring work done by algorithms. Nonnumerical algorithms: searching, sorting, graph spanning and traversal, string matching. Numerical topics: polynomial and matrix arithmetic. P and NP completeness. *Prerequisites: Math 51 or 52, and 61 or equivalent.* (Also listed as COEN 179.)

164. Computer Simulation

Techniques for generation of probability distributions. Computer models of queueing in inventory and scheduling. Simulation of economic systems. Monte Carlo methods for physical systems. Offered in alternate years. NCX†

165. Linear Programming

Algebraic background. Transportation problem. General simplex methods. Linear programming and theory of games. Numerical methods. Offered in alternate years.

166. Numerical Analysis

Numerical algorithms and techniques for solving mathematical problems. Linear systems, integration, approximation of functions, solution of nonlinear equations. Analysis of errors involved in the various methods. Direct methods and iterative methods. *Prerequisite: the ability to program in some scientific language.*

167. Switching Theory and Boolean Algebra

Switching algebra and Boolean algebra. Minimization via Karnaugh maps and Quine-McCluskey, state compatability and equivalence. Machine minimization. Faults. State identification, finite memory, definiteness, information losslessness. Offered in alternate years.

† Exempted from challenge

168. Computer Graphics

Systematic and comprehensive overview of interactive computer graphics such as mathematical techniques for picture transformations and curve and surface approximations. *Math 53 recommended but not required.*

169. Programming Languages

Comparative study of major classes of programming languages. Introduction to theoretical definitions of languages and run-time concerns, with emphasis on good points and deficiencies of various languages and on using the appropriate language for a given task. Programs written in several languages, e.g., FORTRAN, LISP, SNOBOL, COBOL, C, Path-Pascal. Offered in alternate years.

170. Development of Mathematics

A selection of mathematical concepts with their historical context. *Prerequisite: upper-division standing in a science major.*

172. Problem Solving

Use of induction, analogy, and other techniques in solving mathematical problems. Offered in alternate years.

174. Differential Geometry

Introduction to curves and surfaces. Differential forms, Frenet formulas, frame fields, and differentiation on surfaces. Offered in alternate years. *Prerequisite: Math 53.*

175. Theory of Numbers

Fundamental theorems on divisibility, primes, congruences. Number theoretic functions. Diophantine equations. Quadratic residues. Partitions. Offered in alternate years.

176. Combinatorics

Permutations and combinations, generating functions, recursion relations, and a selection of topics from combinatorial geometry, graph enumeration, and Pólya counting theorem.

177. Graph Theory

Selected topics from planarity, connectedness, trees (enumeration), digraphs, graph algorithms, and networks. Offered in alternate years.

190. Upper-Division Seminars

Advanced topics in algebra, geometry, or analysis. Research projects.

196. Advanced Topics

Offered each year in an advanced area of mathematics not ordinarily covered in the regularly offered courses. Often an area of current interest.

199. Independent Study

Reading and investigation for superior students under the direction of a staff member. This can be used only to extend, not to duplicate, the content of other courses.

DEPARTMENT OF MODERN LANGUAGES AND LITERATURES

Professors: Francisco Jiménez, Victor B. Vari
Associate Professors: Cedric U. Busette, Catherine R. Montfort, Helen E. Moritz *(Chair),* Andrew I. Rematore, Tonia Caterina Riviello, K-G Seely, Christian L. van den Berghe
Assistant Professors: Rose Marie Suñé Beebe, Mario Cesareo, Elena M. De Costa, Maryellen Toman Mori, Gudrun Tabbert-Jones
Research Affiliate: Verónica González-Mena LoCoco
Phil and Bobbie Sanfilippo Professor: Francisco Jiménez
Harold and Edythe Toso Professor: Victor B. Vari

The Department of Modern Languages offers courses in French, German, Italian, Japanese, and Spanish. The courses are designed to help students achieve proficiency in both the oral and written language and to provide them with an understanding of the experiences, values, and traditions of those peoples whose languages are studied. Courses range from beginning language to linguistics, from an introduction to literary texts to advanced courses in literature and culture. All courses are open to any student with the requisite preparation.

MAJORS AND MINORS

The Department of Modern Languages offers the Bachelor of Arts degree with a major in French, German, Italian, or Spanish. An academic minor is available in French, German, Italian, Spanish or Japanese. For particulars, see the entries on the individual languages.

SUBJECT-MATTER PREPARATION FOR ADMISSION TO TEACHING CREDENTIAL PROGRAMS

The state of California requires that students seeking a credential to teach French, German, or Spanish in California secondary schools either pass a subject-area examination or successfully complete the state-approved Subject-Matter Preparation Program in the language to be taught. The credential itself requires a fifth year of study and teaching.

Subject-Matter Preparation programs approved by the state of California are offered by the Department of Modern Languages in French, German, and Spanish. These programs require the same courses as the majors in those languages, but with some additional restrictions in subject area and some additional course work. For specifics, consult the requirements for the Subject-Matter Preparation programs given under the individual languages. Students interested in one of these programs should consult with its coordinator at an early date.

Note: Admission to fifth-year credential programs requires practicum work and/or experience in school-related settings. Students can meet this requirement by enrolling in Education 98/198B.

HIGH SCHOOL CREDIT AND PLACEMENT

The Department of Modern Languages recommends the following formula for students who wish to continue a language studied in high school. Those who have had two years of language should enter Language 2; those with four years of language should enter Language 22; those with three years of language should consult the language faculty. Students whose language background is inadequate to permit following the above formula may be permitted to enter lower-numbered courses for credit after consultation with a member of the language faculty.

Students having the necessary proficiency, as demonstrated by an interview with a member of the language faculty, may enroll in higher-numbered courses than those of the placement formula. Once proficiency has been established, lower-division students may enroll in upper-division courses with the permission of the instructor. Such courses will be counted as fulfilling major requirements.

COURSES EXEMPTED FROM CHALLENGE

Courses numbered 1 through 103 are not open to challenge.

MEDIA LABORATORY

Throughout lower-division courses, and in such upper-division work as the instructor may specify, students are required to use the facilities of the media laboratory to increase their language skills.

CONVERSATION GROUPS

As an adjunct to many language courses, the department offers students the opportunity to participate in small conversation groups of five or six students, under the direction of a native speaker or an advanced major.

FRENCH MAJOR AND MINOR

In addition to University Curriculum and College requirements for the Bachelor of Arts degree and such lower-division courses as the individual candidate may need, the French major consists of a minimum of 40 quarter units of upper-division work in French language, literature, and culture, including French 100 and 101 (Advanced French I and II) and French 185 (French Applied Linguistics) or their equivalents, as approved by the student's major adviser. Recommended electives include courses in French or European history, comparative literature, art history, and additional work in linguistics.

The minor in French requires, in addition to such lower-division courses as the student may need, completion of a minimum of 19 quarter units of upper-division work in French, including French 100 and 101 or department-approved substitutes.

At least 20 of the 40 upper-division units taken for the major and at least 10 of the 19 upper-division units taken for the minor must be earned in courses

taught by Santa Clara University faculty. Students must achieve a 2.0 grade point average in upper-division courses taken in fulfillment of a French major or minor.

Subject-Matter Preparation Program in French (for prospective teachers only)

Coordinator: Dr. K-G Seely

The Subject-Matter Preparation Program in French is similar to the French major, but has some additional requirements. Students must apply for and be admitted to the program. Forty-five quarter units of upper-division work in French are required, including at least 10 units in French culture and civilization, at least 20 units in French literature, and French 185 (French Applied Linguistics). In addition, the program requires two courses in European and/or French history and one course in the history of art that includes a focus on French artists. Students interested in the Subject-Matter Preparation Program should consult the coordinator at an early date.

Students in the Subject-Matter Preparation Program are expected to maintain a 3.0 grade point average in the French major and a cumulative grade point average of 2.75. Each student's oral proficiency in the French language will be assesssed by a designated member of the French faculty to determine any need for further language training.

For further stipulations and recommended electives, consult the coordinator.

COURSE DESCRIPTIONS

1. Elementary French I

Development of skills in understanding, speaking, reading, and writing French. Language laboratory required.

2. Elementary French II

Continuation of French 1.

3. Elementary French III

Completion of elementary French.

21. Intermediate French I

Review of spoken and written French. Readings in original prose. *Prerequisite: French 3 or equivalent.*

22. Intermediate French II

Continued review of the French language. Discussions of readings (short stories, novellas, and/or plays).

100. Advanced French I

Intensive grammar, speaking, and composition. Research projects and/or participation in theatricals. Required of all majors.

101. Advanced French II

Introduction to literary analysis in poetry, prose, and drama. Required of all majors. (May be taken concurrently with certain other upper-division courses.)

106. Advanced French Conversation

Intensive work stressing the single skill of French conversation in everyday situations. No auditors. *Prerequisite: French 100.* NCX†

† Exempted from challenge

108. French Business Culture and Institutions

Basic French business terminology and practices. Business letter writing emphasized. Examination of French business institutions (agriculture, finance, advertising, transportation, etc.). Special emphasis on understanding the underlying cultural mores that make French business different from U.S. business.

110. Culture and Civilization I

Cultural, political, economic, artistic, educational, and social aspects of France.

111. Culture and Civilization II

Cultural, political, economic, educational, and social aspects of French-speaking societies outside of France: Belgium, Luxembourg, Monaco, Québec, Switzerland, French-speaking Africa, etc. Cross-cultural comparative approaches. May be taken independently from French 110.

115. Survey of French Literature I

Readings in French literature from its beginnings in the Moyen Age to the end of the 18th century.

116. Survey of French Literature II

Continuation of French 115. Readings in French literature of the 19th and 20th centuries. May be taken independently.

120. Moyen Age

Epic, lyric, and courtly literature of medieval France: Roland, *l'amour courtois* and the Troubadours, Chrétien de Troyes, *Tristan et Iseut,* Artur, the early theatre.

130. 16th Century

La Renaissance: readings in Rabelais, the Pléiade poets, and Montaigne.

140. 17th Century

Le Grand Siècle: evolution of literary and philosophical currents. Emphasis on Corneille, Racine, Molière, La Fontaine, Descartes, Pascal, etc.

150. 18th Century

Le Siècle des lumières: studies in the literature and thought of the Age of Enlightenment. Emphasis on Montesquieu, Voltaire, Diderot, and Rousseau.

160. 19th Century I

Romantic literature: prose and poetry (Chateaubriand, Stendhal, Lamartine, Hugo, Balzac, Vigny, etc.).

161. 19th Century II

Realist, Naturalist, and Symbolist literature (Baudelaire, Flaubert, Zola, Mallarmé, etc.).

170. 20th Century I

Writings of *la belle époque* and *entre deux guerres* (Proust, Gide, Apollinaire, Dada, Surrealism, etc.).

171. 20th Century II

The *engagée* literature, the Anti-theatre, the New Novel, and current directions (Anouilh, Sartre, Camus, Ionesco, Robbe-Grillet, Tournier, etc.).

172. Cinéma

Origins and development of the art of film in France. Not a film-making course. Evolution of cinematic techniques as exemplified in the feature films of individual directors. Weekly screenings with discussions, analyses, and *travaux pratiques.* No unofficial auditors.

180. Seminars

Variable topics in culture, literature, and film. May be retaken for credit.

182. Women in French Literature: Authors and Characters‡

Outstanding French women writers from the Middle Ages to the present (Marie de

‡ Course included in Women's Studies program

France, Madame de Lafayette, George Sand, Colette, Marguerite Duras, Simone de Beauvoir).

183. 20th-Century French Women Writers‡

The varied literary contributions of French and Francophone writers such as Colette, Simone de Beauvoir, Marguerite Duras, Elisabeth Badinter, Gabrielle Roy, Marianna Bâ; their differing perceptions of the traditional stereotypes of women and perspectives related to social class. Consideration of whether feminine literature has unique qualities.

185. French Applied Linguistics

Aspects of modern French linguistics (phonology, phonetics, morphology, syntax). Contrastive analysis. Required of all majors and prospective French teachers.

198. Directed Study

Individually designed programs of advanced study. Restricted to seniors who are declared French majors or minors and who find themselves in special circumstances. May be taken only once. Courses exempted from challenge may not be taken as Directed Study. Written course outline must be approved by instructor and department chair in advance of registration. (1–3 units)

199. Directed Reading

Individually designed programs of advanced readings. Written permission of the instructor and department chair is required in advance of registration.

‡ Course included in Women's Studies program

GERMAN MAJOR AND MINOR

In addition to University Curriculum and College requirements for the Bachelor of Arts degree and such lower-division courses as the individual candidate may need, the German major consists of a minimum of 40 quarter units of upper-division work in German language and literature, including German 100 and 101 (Advanced German I and II) or their equivalents. All major programs must be approved by the student's faculty adviser. Recommended elective courses include English 101 (Linguistics), English 102 (Theories of Modern Grammar), and History 128 or 129 (Germany).

The minor in German requires, in addition to such lower-division courses as the student may need, completion of a minimum of 19 quarter units of upper-division work in German, including German 100 and 101 or department-approved substitutes.

At least 20 of the 40 upper-division units taken for the major and at least 10 of the 19 upper-division units taken for the minor must be earned in courses taught by Santa Clara University faculty. Students must achieve a 2.0 grade point average in upper-division courses taken in fulfillment of a German major or minor.

Subject-Matter Preparation Program in German (for prospective teachers only)

Coordinator: Dr. Gudrun Tabbert-Jones

The Subject-Matter Preparation Program in German is similar to the German major, but has some additional requirements. Students must apply for and be admitted to the program. Forty-five quarter units of upper-division work in German are required, including at least 5 units in German culture and civilization, at least 20 units in German literature, and German 175 (German Applied Linguistics). In addition, the program requires two courses in European and/or German history and one course in history of the English language, English linguistics, or modern English grammar. Students interested in the Subject-Matter Preparation Program should consult the coordinator at an early date.

Students in the Subject-Matter Preparation Program are expected to maintain a 3.0 grade point average in the German major and a cumulative grade point average of 2.75. Each student's proficiency in the German language will be assessed by designated members of the German faculty to determine any need for further language training.

For further stipulations and recommended electives, consult the coordinator.

COURSE DESCRIPTIONS

1. Elementary German I

Development of skills in understanding, speaking, reading, and writing modern German. Cultural information on the German-speaking countries. Language laboratory required.

2. Elementary German II

Continuation of German 1.

3. Elementary German III

Completion of elementary German.

5. German for Reading Knowledge

Alternate to German 3 leading to the reading of scholarly articles in various fields of study. *Prerequisite: German 2 or equivalent.*

21. Intermediate German I

Review of German grammar, short stories, or essays on culture and civilization. Progressive exercises in conversation.

22. Intermediate German II

Continuation of German 21. Accelerated readings, conversation, and writing.

100. Advanced German I

Advanced reading, composition, and conversation. Emphasis on conversation and career-oriented language. Required of all majors.

101. Advanced German II

Reading of literary texts, composition, and discussion. Required of all majors. Completion or equivalent knowledge admits students to higher-numbered courses.

110. History of German Civilization

Cultural history of the German-speaking countries from earliest times to 1945.

111. Contemporary German Civilization

Geography, culture, education, politics, and the economy in the German-speaking countries since 1945.

130. The Classical Age

Major works by Goethe and Schiller.

140. 19th-Century Romanticism

Philosophy of the Romantics. German fairy tale. Selected works by Kleist, Eichendorff, Heine, and Wagner.

141. 19th-Century Realism

Works by Büchner, Hebbel, Fontane, Marx, and Hauptmann.

150. 20th-Century Novel

Works by Kafka, Hesse, Thomas Mann, Christa Wolf, Böll, and others.

151. 20th-Century Drama

Plays by Brecht, Borchert, Frisch, and Dürrenmatt and Brecht's theoretical writings.

160. The German Novelle

Characteristic features of the *Novelle* as opposed to *Roman* and *Erzählung*. Examples from Theodor Storm to Thomas Mann.

161. Survey of Lyric Poetry

Introduction to the analysis of poetry. Numerous examples from all German literary periods beginning with 1600.

175. German Applied Linguistics

Modern German linguistics. Emphasis on phonology, phonetics, and contrastive analysis of German and English.

180. Special Topics

Variable topics in culture and literature. May be retaken for credit.

182. Women in German Literature: Authors and Characters‡

Works by and about German women. Authors studied include Droste-Hulshof, Böll, Wolf, Handke, Kaschnitz, Wander, and others.

198. Directed Study

Individually designed programs of advanced study. Restricted to seniors who are declared German majors or minors and who find themselves in special circumstances. May be taken only once. Courses exempted from challenge may not be taken as Directed Study. Written-course outline must be approved by instructor and department chair in advance of registration. (1–3 units)

199. Directed Reading

Individually designed programs of advanced readings. Written permission of the instructor and department chair is required in advance of registration.

Literature in Translation

Note: Literature in translation courses cannot be used to fulfill the foreign language requirement.

115. German Literature in English Translation

Reading and analysis of masterpieces of German literature written between 1750 and 1970. Selection dependent upon available translations.

‡ Course included in Women's Studies program

ITALIAN MAJOR AND MINOR

In addition to University Curriculum and College requirements for the Bachelor of Arts degree and such lower-division courses as the individual candidate may need, the Italian major consists of a minimum of 40 quarter units of upper-division work in Italian language and literature, including Italian 100 and 101 (Advanced Italian I and II) or their equivalents. All major programs must be approved by the student's faculty adviser. Recommended electives include courses in mythology, comparative literature, and Renaissance history.

The minor in Italian requires, in addition to such lower-division courses as the student may need, completion of a minimum of 19 quarter units of upper-division work in Italian, including Italian 100 and 101 or department-approved substitutes.

At least 20 of the 40 upper-division units taken for the major and at least 10 of the 19 upper-division units taken for the minor must be earned in courses taught by Santa Clara University faculty. Students must achieve a 2.0 grade point average in upper-division courses taken in fulfillment of an Italian major or minor.

COURSE DESCRIPTIONS

1. Elementary Italian I

Development of skills in understanding, speaking, reading, and writing modern Italian. Language laboratory required.

2. Elementary Italian II

Continuation of Italian 1.

3. Elementary Italian III

Completion of elementary Italian.

15. Italian Conversation and Composition

Intensive work stressing the skills of spoken and written Italian in everyday situations. No prerequisite. Summer course; offered *only* in Assisi, Italy.

21. Intermediate Italian I

Review of fundamentals of spoken and written Italian. Progressive readings reflecting Italian culture and values. Progressive exercises in conversation and composition. *Prerequisite: Italian 3 or equivalent.*

22. Intermediate Italian II

Continuation of Italian 21.

62. Survey of Italian Culture and Civilization

Highlights of Italian history, geography, art, music, and culture from their origins to the present. Summer course; offered *only* in Assisi, Italy.

100. Advanced Italian I

Composition, reading, and conversation. Required of all majors. *Prerequisite: Italian 22.*

101. Advanced Italian II

Continuation of Italian 100. Required of all majors.

110. Italian Civilization I

Fundamental aspects of Italian history, art, and culture from their origins to the *seicento.*

111. Italian Civilization II

Continuation of Italian 110. May be taken independently. From the *settecento* to the present.

112. Survey of Italian Culture and Civilization

Highlights of Italian history, geography, art, music, and culture from their origins to the present. Summer course; offered *only* in Assisi, Italy. *Prerequisite: Italian 100.*

113. Cinema e Cultura

A cultural portrait of modern Italy as reflected in its cinema. Films by Roberto Rossellini, Luchino Visconti, Vittorio De Sica, Michelangelo Antonioni, Federico Fellini, the Taviani brothers, Francesco Rosi, Bernardo Bertolucci, and Liliana Ginanneschi illustrate cultural and intellectual change in the 20th century.

120. Survey of Italian Literature I

From its origin to the *seicento.*

121. Survey of Italian Literature II

From the *settecento* to the present.

130. Dante, La Divina Commedia I

Inferno and *Purgatorio.*

131. Dante, La Divina Commedia II

Purgatorio and *Paradiso.*

140. Duecento, Trecento

Emphasis on Dante's minor works, Petrarch's poetry, and Boccaccio's *Decameron.*

150. Quattrocento, Cinquecento (Rinascimento)

Important trends in the literary masterpieces of the Renaissance. Significant works of Ariosto, Tasso, Leonardo, Machiavelli, Lorenzo de Medici, Poliziano, Castiglione.

160. Settecento

Salient works of Vico, Goldoni, Parini, and Alfieri.

170. Ottocento, I Promessi Sposi

Discussion of the works of Foscolo, Leopardi, Manzoni's poetry. Carducci, Pascoli, and Verga.

180. Novecento

Italian literature of the 20th century. Main trends in poetry, drama, and the novel from Pirandello to the present.

182. 20th-Century Italian Women Writers‡

Critical analysis of major works by leading women writers and the changing role of women in 20th-century Italian society: Grazia Deledda, Sibilla Aleramo, Elsa Morante, Natalia Ginzburg, Oriana Fallaci, Maria Bellonci, Giuliana Morandini, Dacia Maraini, Laudomia Bonanni, Lalla Romano, Francesca Duranti, Isabella Bossi Fedrigotti, and Gina Lagorio.

198. Directed Study

Individually designed programs of advanced study. Restricted to seniors who are declared Italian majors or minors and who find themselves in special circumstances. May be taken only once. Courses exempted from challenge may not be taken as Directed Study. Written course outline must be approved by instructor and department chair in advance of registration. (1–3 units)

199. Directed Reading

Individually designed programs of advanced readings. Written permission of the instructor and department chair is required in advance of registration.

‡ Course included in Women's Studies program

JAPANESE MINOR

In addition to such lower-division courses as the student may need, the minor in Japanese requires a minimum of 19 quarter units of upper-division work in Japanese, including Japanese 100, 101, and 102 (Advanced Japanese I, II, and III) or department-approved equivalents. One upper-division course in Japanese literature taught in English may be included among the 19 units required for the minor. Interested students should consult with the Japanese section head.

At least 10 of the 19 upper-division units taken for the Japanese minor must be earned in courses taught by Santa Clara University faculty. Students must achieve a 2.0 grade point average in upper-division courses taken in fulfillment of the Japanese minor.

COURSE DESCRIPTIONS

1. Elementary Japanese I

Development of skills in understanding, speaking, reading, and writing modern Japanese. Language laboratory required.

2. Elementary Japanese II

Continuation of Japanese 1.

3. Elementary Japanese III

Completion of elementary Japanese.

21. Intermediate Japanese I

New grammatical structures and additional Chinese written characters. Progressive exercises to develop facility in conversation, reading, and composition. *Prerequisite: Japanese 3 or equivalent.*

22. Intermediate Japanese II

Continuation of Japanese 21.

23. Intermediate Japanese III

Completion of intermediate Japanese. *Prerequisite: Japanese 22.*

100. Advanced Japanese I

Continued practice in using complex grammatical structures. Reading and discussion of topics taken from a variety of sources. *Prerequisite: Japanese 23 or equivalent.*

101. Advanced Japanese II

Continuation of Japanese 100. *Prerequisite: Japanese 100 or equivalent.*

102. Advanced Japanese III

Continuation of Japanese 101. *Prerequisite: Japanese 101 or equivalent.*

113. Readings in Japanese I

Readings and discussions in Japanese of selected sociological, literary, and journalistic texts.

114. Readings in Japanese II

Continuation of Japanese 113. *Prerequisite: Japanese 113 or equivalent.*

198. Directed Study

Individually designed programs of advanced study. Restricted to seniors who are declared Japanese minors and who find themselves in special circumstances. May be taken only once. Courses exempted from challenge may not be taken as Directed Study. Written course outline must be approved by instructor and department chair in advance of registration. (1–3 units)

199. Directed Reading

Individually designed programs of advanced readings. Written permission of instructor and department chair required in advance of registration.

Literature in Translation

Note: Literature in translation courses cannot be used to fulfill the foreign language requirement. One course may be counted toward the Japanese minor.

125. Colloquium: Japanese Literature and Culture

Topic varies. Study and discussion of selected themes in Japanese literature and culture. May be retaken for credit. NCX†

140. Modern Japanese Literature in Translation

Major literary figures and trends from 1868 to the present. Particular attention to the interaction between traditional and modern social and literary values.

150. Postwar Japanese Literature in Translation

Major literary trends and representative fictional works since World War II that reflect Japan's transformation from a devastated Third World nation to a prosperous cosmopolitan society.

182. Japanese Women's Literature in Translation‡

Introduction to representative works of fiction by major women writers. Traces the evolution of feminist consciousness in these writings.

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† Exempted from challenge ‡ Course included in Women's Studies program

SPANISH MAJOR AND MINOR

In addition to University Curriculum and College requirements for the Bachelor of Arts degree and such lower-division courses as the individual candidate may need, the Spanish major consists of a minimum of 40 quarter units of upper-division work in Spanish language, literature, and culture, including

1. Spanish 100 and 101 (Advanced Spanish I and II)
2. Spanish 175 (Spanish Applied Linguistics I)
3. At least one (but not more than three) from Spanish 120, 121, 130, 131
4. Additional electives in Spanish to total 40 quarter units, chosen with the approval of the Spanish adviser (Every program must include both Latin American and Spanish Peninsular literature or culture.)

Additional course limitations may apply, depending on career objectives. Courses in the history of Latin America and Spain are recommended.

The minor in Spanish requires, in addition to such lower-division courses as the student may need, completion of a minimum of 19 quarter units of upper-division work in Spanish, including Spanish 100 and 101 or department-approved substitutes and at least one course in Hispanic literature or culture.

At least 20 of the 40 upper-division units taken for the major and at least 10 of the 19 upper-division units taken for the minor must be earned in courses taught by Santa Clara University faculty. Students must achieve a 2.0 grade point average in upper-division courses taken in fulfillment of a Spanish major or minor.

Subject-Matter Preparation Program in Spanish (for prospective teachers only)

Coordinator: Dr. Andrew I. Rematore

The Subject-Matter Preparation Program in Spanish is similar to the Spanish major, but has some additional requirements. Students must apply for and be admitted to the program. Forty-five quarter units of upper-division work in Spanish are required, including Spanish 175 and 176 (Spanish Applied Linguistics I and II) and courses in specified areas of Hispanic literature and culture. In addition, the program requires work in both the history of Hispanic civilization and the history of Hispanic art. Students interested in the Subject-Matter Preparation Program should consult the coordinator at an early date.

Students in the Subject-Matter Preparation Program are expected to maintain a 3.0 grade point average in the Spanish major and a cumulative grade point average of at least 2.75. Prior to the senior year (or at the point of entry into the program if during the senior year), each student's proficiency in the writing of English and the writing and speaking of Spanish will be assessed by two or more designated members of the Spanish faculty to determine any need for further study in these areas.

For further stipulations and recommended electives, consult the coordinator.

COURSE DESCRIPTIONS

1. Elementary Spanish I

Designed for those having no previous study of Spanish. Development of skills in understanding, speaking, reading, and writing modern Spanish, in that order. Development of an understanding of Hispanic culture.

2. Elementary Spanish II

Continuation of Spanish 1.

3. Elementary Spanish III

Completion of elementary Spanish.

21. Intermediate Spanish I

The first course in a three-part review of the fundamentals of spoken and written Spanish. Progressive readings and exercises in conversation and composition. Development of an understanding of Hispanic culture. *Prerequisite: Spanish 3 or three years of high school Spanish.*

22. Intermediate Spanish II

Continuation of the review of Spanish structure, together with progressive development of all Spanish skills. Broadening appreciation of Hispanic culture through reading and discussion of literary works. *Prerequisite: Spanish 21 or four years of high school Spanish.*

23. Intermediate Spanish III

Completion of intermediate Spanish. *Prerequisite: Spanish 22 or equivalent.*

100. Advanced Spanish I

Continued development of all Spanish skills at an advanced level. Special attention to composition. Systematic introduction to literary analysis. Required of all majors and minors. *Prerequisite: Spanish 23 or equivalent.*

101. Advanced Spanish II

Continued development of all Spanish skills and completion of the introduction to literary analysis begun in Spanish 100. Required of all majors and minors. *Prerequisite: Spanish 100 or equivalent.*

Prerequisites: Completion of Spanish 100 and 101, or evidence of equivalent preparation, will admit students to higher-numbered courses.

103. Spanish Grammar and Composition

Intensive work in Spanish grammar and composition. Diagnostic-prescriptive approach based on analysis of the writing problems of enrolled students. *Can* be counted toward a minor; *cannot* be counted toward a major. *Prerequisites: Spanish 100 and 101 or equivalent.*

110. Advanced Spanish Conversation

Advanced work stressing the development of self-expression in Spanish. *Prerequisite: Spanish 101 or equivalent and permission of the instructor.* NCX†

120. Major Works of Spanish Literature I

Readings in Spanish literature from the early forms of Spanish literature to the end of the 17th century.

121. Major Works of Spanish Literature II

Readings in Spanish literature of the 18th and 19th centuries. Continuation of Spanish 120. May be taken separately.

122. The Spanish Picaresque Novel

A study of the development of the Spanish picaresque novel and its influence on other European literatures. Key works, analyzed from a sociohistorical perspective, include *Lazarillo de Tormes* (1554), *El Guzmán de Alfarache* (1599), *El Buscón* (1626).

123. Siglo de Oro Drama

A study of the Spanish *comedia* of the *Siglo de Oro*. Particular emphasis on the impact of Lope de Vega and the creation of a national theatre. Literary analysis of the *comedias* of the most representative Spanish dramatists of the period: Calderón de la Barca, Rojas Zorilla, Tirso de Molina, Ruiz de Alarcón, Guillén de Castro, and Lope de Vega.

124. Realism in the 19th-Century Spanish Novel

A study of the decline of Romanticism and the evolution of the Realist movement in 19th-century Spain. Special emphasis on the novels of Fernán Caballero, Alarcón, Galdós, and Valera.

125. Colloquium: Spanish Literature and Culture

Topic varies. Study and discussion of selected themes in Spanish Peninsular literature and culture. May be retaken for credit. NCX†

130. Survey of Latin American Literature I

Latin American literature from the pre-Columbian period to 1888.

131. Survey of Latin American Literature II

Latin American literature from 1888 to present.

135. Colloquium: Latin American Literature and Culture

Topic varies. Reading and discussion of selected themes in Latin American literature and culture. May be retaken for credit. NCX†

140. Modern Latin American Literature I

Reading, analysis, and discussion of the works of major Latin American writers of the early 20th century, e.g., Azuela, Gallegos, Barrios, Prado, and Romero.

† Exempted from challenge

141. Modern Latin American Literature II

Reading, analysis, and discussion of the works of major Latin American writers of the late 19th and early 20th centuries. Emphasis on the novel.

145. Mid-20th-Century Latin American Literature

Reading, analysis, and discussion of the works of major Latin American writers from 1946 to 1962. Carpentier, Yáñez, Fuentes, and others.

146. Contemporary Latin American Literature

Reading, analysis, and discussion of the works of major Latin American writers of the present. García Márquez, Vargas Llosa, and others.

150. 20th-Century Spanish Literature I

Major writers of Spain from 1898 to 1936. Particular emphasis on the Generation of 1898.

151. 20th-Century Spanish Literature II

Major writers of Spain from 1936 to the present.

165. Cervantes: Don Quijote

Cervantes' masterpiece, as a reflection of Spanish society during the Spanish Empire, an exemplar of Baroque art and a synthesis and culmination of narrative prose.

175. Spanish Applied Linguistics I

Introduction to the study of applied linguistics. Detailed scientific analysis of the phonology of modern Spanish. Contrastive analysis of Spanish and English sound systems. Required of all majors and of all prospective teachers of Spanish.

176. Spanish Applied Linguistics II

Detailed scientific analysis of the morphology and syntax of modern Spanish. Contrastive analysis within the Spanish structure system and between the Spanish and English structure systems. *Prerequisite: Spanish 175.* Required of all prospective teachers of Spanish.

198. Directed Study

Individually designed programs of advanced study. Restricted to seniors who are declared Spanish majors or minors and who find themselves in special circumstances. May be taken only once. Courses exempted from challenge may not be taken as Directed Study. Written course outline must be approved by instructor and department chair in advance of registration. (1–3 units)

199. Directed Reading

Individually designed programs of advanced readings. Written permission of the instructor and department chair is required in advance of registration.

Literature in Translation

Note: Literature in translation courses cannot be used as credit toward a Spanish major, minor, or foreign language requirement.

115. 20th-Century Mexican Literature in Translation

Reading, analysis, and discussion of outstanding works by modern and contemporary Mexican writers. Emphasis on the novel.

117. Latin American Literature in Translation

Reading, analysis, and discussion of works of leading Latin American writers. Emphasis on contemporary novelists of South America.

Modern Literature and Culture

Note: Knowledge of a foreign language is not necessary for the following comparative course. It cannot be used to fulfill a major or minor requirement in a foreign language or to fulfill the foreign language requirement.

180. International Cinema

An interdisciplinary course treating film as a medium of cultural expression in China, England (or Australia or Canada), France, Germany, Italy, Japan, Latin America, Russia, and Spain.

DEPARTMENT OF MUSIC

Associate Professors: Hans C. Boepple, Nancy Wait Kromm, Lynn R. Shurtleff
Assistant Professor: Teresa McCollough *(Chair)*
Frank Sinatra Professor and Artist-in-Residence: Henry Mollicone

The Department of Music at Santa Clara University is committed to the education of the whole person: intellectual, emotional, physical, and spiritual. The goal of the Department of Music is to provide an intellectual and stimulating artistic environment, which fosters individual expression and creativity through the study of music and musical performance. Inasmuch as music is a fundamental characteristic of the human experience and an important component of the liberal arts education within the context of a Jesuit university, the curriculum is designed to provide students of diverse backgrounds with the skills necessary not only to understand and to perform music, but also to appreciate music's role in human history and its potential enhancement of the lives of all people.

The Bachelor of Arts in Music can provide preparation for many career options. Classes providing essential skills for the comprehension and performance of music are offered alongside courses designed to create an appreciation for music's changing role in our communities. Graduates in music have pursued careers in musical performance, pedagogy, theory, musicology, and arts administration, as well as careers outside of music in medicine, law, engineering, business, and the humanities. The Department of Music eagerly supports all majors and minors who find the discipline, creativity, and spirituality inherent in the study of music to be a valuable part of their education and their life goals.

Santa Clara University is an accredited member of the National Association of Schools of Music.

REQUIREMENTS FOR MAJOR AND MINOR

Bachelor of Arts with a Major in Music

Students working toward a Bachelor of Arts in Music, in addition to completing the University and College requirements, must earn a minimum of 64 quarter units in the department. The following courses must be included: Musicianship I–VI (Music 51, 52, 53, 54, 55, 56); Music in American Culture or World Music Survey (Music 71 or 72); Orchestration/Conducting (Music 150); Music History I–III (Music 170, 171, 172); Music in the Community (Music 173); and a music elective of their choice (Music 73, 174, 175, 176, 183).

Music majors must be enrolled in Keyboard Proficiency (Music 37) until the requirements are passed and must complete one quarter of Directed Study in Pedagogy (Music 199F), as assigned by their individual adviser, before graduating.

All music majors must be enrolled in an ensemble and private lessons during every quarter they are declared majors, with experience in at least two different ensembles.

Bachelor of Arts with a Minor in Music

Students working toward a Minor in Music, in addition to completing the University and College requirements in their major, must earn a minimum of 39 quarter units (eight courses) in the department. The following courses must be included: Musicianship I–IV (Music 51, 52, 53, 54) and Music in the Community (Music 173). They may choose either Music in American Culture or World Music Survey (Music 71 or 72) and two classes from the Music History sequence (Music 170, 171, or 172).

All music minors must complete a minimum of two years ensemble experience and two years of private individual instruction on an instrument or voice.

Music Honors Program

The Music Department awards honors upon graduation to students wishing to attain a higher level of achievement in performance, music theory, composition, or music history. Students may apply for the program upon reaching junior status, typically by the last quarter of their sophomore year. To be eligible, they must have at least a 3.0 overall GPA and a 3.5 GPA in all music courses, including applied lessons. Upon admission, students develop a project proposal for their specific specialization area, to be completed by the end of their senior year. Students may pursue honors in either one area or a combination of areas, in consultation with the department chair and their adviser.

Interested students should consult the department chair early in their program.

Department of Music Performer's Certificate for Distinguished Musical Performance

Established in 1980 by the Music Department faculty, the Performer's Certificate is awarded to a student demonstrating exceptional accomplishment in musical performance.

American Choral Directors Association National Choral Student Award

This award is given to a student who has been involved in continued participation in choral ensembles, has provided service to the ensemble and conductor, has demonstrated a high degree of choral proficiency and music literacy, and has contributed to the advancement of choral singing at the University.

Arrigo and Catherine Descalzi Prize

Established in 1990 in honor of Arrigo and Catherine Descalzi, this award is presented to the senior music student who, in the judgment of the Music Department faculty, best demonstrates artistic growth and dedication to the art of music.

Departmental Music Scholarships

Partial tuition and private lesson scholarships are available in the Department of Music for qualified students by audition. Check with the Music Department office for details on requirements and audition times.

COURSE DESCRIPTIONS

Note: An instrument fee is required for specific music courses.

Music Theory and Composition

51. Musicianship I

An integrated approach to the study and appreciation of music. Focus on ear training, sight-singing, theory and harmony, score analysis, and critical listening. Basic keyboard skills and an overview of music history. Open to nonmajors.

52. Musicianship II

Continuation of Music 51. Open to nonmajors with permission of instructor. *Prerequisite: Music 51 or permission of instructor.*

53. Musicianship III

Continuation of Music 52. Open to nonmajors with permission of instructor. *Prerequisite: Music 52 or permission of instructor.*

54. Musicianship IV

Continuation of Music 53. Emphasis on form and analysis and part-writing. *Prerequisite: Music 53 or permission of instructor.*

55. Musicianship V

Continuation of Music 54. *Prerequisite: Music 54 or permission of instructor.*

56. Musicianship VI

Continuation of Music 55. *Prerequisite: Music 55 or permission of instructor.*

150. Orchestration/Conducting

Course is divided into two five-week segments. The first is devoted to basic techniques of instrumentation and orchestration; the second, to fundamentals of conducting, score reading, and rehearsal techniques. Open to nonmajors with permission of instructor.

Music History and Literature

11. Performance and Culture I

Interdisciplinary approach to the survey of Western Culture through the arts of music, theatre, and dance. Ancient Greece and Rome through the Medieval world. Open to majors and nonmajors. *Fulfills part of the Western Culture core requirement.* (Also listed as Theatre and Dance 11.)

12. Performance and Culture II

Continuation of Music 11. Survey of performance and culture in Renaissance Italy and England; 17th-century Spain and France; the Enlightenment. Open to majors and nonmajors. *Fulfills part of the Western Culture core requirement.* (Also listed as Theatre and Dance 12.)

13. Performance and Culture III

Continuation of Music 12. Survey of performance and culture from 19th-century Romanticism through contemporary eras. Open to majors and nonmajors. *Fulfills part of the Western Culture core requirement.* (Also listed as Theatre and Dance 13.)

70. Introduction to Music

An overview of Western musical history from the 17th century to the present. Explorations of genres, styles, forms, and musical techniques as they influenced and were integrated into each musical period. Open to nonmajors.

71. Music in American Culture§

A survey of music generated by America's diverse populations, including Latino, African American, Native American, Cajun, Appalachian, and Asian. Open to nonmajors. *Fulfills the College ethnic studies requirement.*

72. World Music Survey

Survey of non-Western music focusing on appreciation of styles, cultural functions, and performing practices of diverse cultures. Open to nonmajors. *Offered in alternate years.*

170. Music History I: Antiquities Through Renaissance

History of Western music from its beginnings through the Renaissance era. Emphasis on literature analysis within the context of the periods. Open to nonmajors with permission of instructor. *Prerequisite: Music 54 or permission of instructor.*

171. Music History II: Baroque Through Classic

History of Western music from the Baroque period through the Classical period. Emphasis on literature analysis within the context of the periods. Open to nonmajors with permission of instructor. *Prerequisite: Music 54 or permission of instructor.*

§ Course included in Ethnic Studies program

172. Music History III: Romantic Through 20th Century

History of Western music from the 19th through the 20th century. Emphasis on literature analysis within the context of the periods. Open to nonmajors with permission of instructor. *Prerequisite: Music 54 or permission of instructor.*

Special Topics

Note: Students under previous curricula must consult with the department chair for adjustments in requirements.

72. Music at Noon

Weekly music event. Class meets each Wednesday and includes concerts, lectures, and lively discussions. Open to nonmajors. (1 unit)

73. History of Rock Music

Survey of rock music from its beginnings to the present. Emphasis on the artistic and sociological influences of rock and pop culture on today's society. Open to nonmajors.

173. Music in the Community

Practical course designed to study music from a social, cultural, and philosophical point of view while placing students into the community as performers, educators, and arts administrators. Emphasis on music's role in our culture today. Hands-on experience in issues such as music education, training, and cultural impact. Open to nonmajors with permission of instructor.

174. Contemporary Topics in Music

Various topics each quarter, from music, gender, and politics to the history of jazz. Check with the Music Department office for current course offerings. Open to nonmajors.

175. Composer Series

Various topics each quarter focus on one composer or group of composers, including Beethoven, Mozart, John Cage and the Avant-garde, etc. Check with the Music Department office for current course offerings. Open to nonmajors.

176. Movement and Music

An awareness of the interaction of music and physical movement; different physical techniques such as Dalcroze, Alexander Technique, and Feldenkrais. Open to nonmajors with permission of instructor.

183. Music Criticism

Problems, principles, and procedures of descriptive and critical analysis in music journalism; relationship of language to description and criticism.

APPLIED MUSIC

Class Instruction

30. Beginning Piano Class

Instruction in rudiments of beginning piano. Class limited to 16 students. May be repeated for credit. Open to nonmajors.

31. Intermediate Piano Class

Continuation of Music 30. Class limited to 16 students. May be repeated for credit. Open to nonmajors. *Prerequisite: Music 30 or permission of instructor.*

32. Beginning Guitar Class

Examination of essential elements required to play guitar in the classical style, including fundamental principles of technique, sight-reading, pedagogic repertoire, history, and literature. May be repeated for credit. Open to nonmajors.

33. Intermediate Guitar Class

Continuation of Music 32, with increased emphasis on the upper positions, technique, repertoire, and interpretation. May be repeated for credit. Open to nonmajors. *Prerequisite: Music 32 or permission of instructor.*

34. Beginning Voice Class

Application of basic vocal techniques to develop singing facility. Practical experience in performing. May be repeated for credit. Open to nonmajors.

35. Intermediate Voice Class

Continuation of Music 34. May be repeated for credit. Open to nonmajors. *Prerequisite: Music 34 or permission of instructor.*

36. Techniques of Musical Auditions

A practical workshop covering all aspects of auditioning for musical theatre and opera. Students prepare and perform materials for audition. Open to nonmajors. (Also listed as Theatre and Dance 68.)

37. Keyboard Proficiency Class

For the music major. The basics of playing the piano: scales, arpeggi, chord progressions, sight-reading, harmonizing a given melody, transposing, and basic simple repertoire. Music majors must be enrolled until the keyboard proficiency requirements have been passed. One contact hour per week/1 unit only. Open to nonmajors. *(A small additional fee is required.)*

Private Instruction

Note: An additional fee is charged for private instruction. There is no fee for studio classes.

Private applied instruction on all instruments is available in the Department of Music. Practice rooms are available to any University student, and some instruments can be rented through the department. Nine private lessons are given each quarter. Nonmajors may sign up for half-hour lessons with permission of the instructor. Where applicable, students must register simultaneously in their instrument or voice studio class; to be arranged by the instructor. May be repeated for credit. Open to nonmajors. (1 unit/quarter)

1/101. ***Piano*** *(simultaneous registration in 1A/101A required)*

1A/101A. ***Piano Studio Class***

2/102. ***Organ***

3/103. ***Harpsichord***

4/104. ***Voice*** *(simultaneous registration in 4A/104A required)*

4A/104A. ***Voice Studio Class***

5/105. ***Violin***

6/106. ***Viola***

7/107. Violoncello

8/108 Contrabass

9/109. Flute

10/110. Oboe

11/111. Clarinet

12/112. Bassoon

13/113. Horn

14/114. Trombone

15/115. Tuba

16/116. Trumpet

17/117. Saxophone

18/118. Percussion

19/119. Guitar

20/120. Harp

21/121. Composition

22/122. Choral Conducting

23/123. Instrumental Conducting

24/124. Jazz Piano

199A. Junior Recital

199B. Senior Recital

199C. Honors Thesis in Music Theory

199D. Honors Thesis in Music History

199E. Honors Thesis in Composition

199F. Directed Study in Pedagogy

200. Recording Engineering

ENSEMBLES

Note: All ensemble courses are open to nonmajors and may be repeated for credit.

40/140. Jazz Ensemble

Open to selected students for preparation and performance of literature for stage and jazz ensembles. By audition only. (1 unit/quarter)

41/141. Renaissance Singers

Open to selected students for preparation and performance in concert of works of the significant choral literature. By audition only. (1 unit/quarter)

42/142. SCU Pops Ensemble

Open to all students without audition. Preparation and performance of all styles including pop, folk, jazz, contemporary, and classical. (1 unit/quarter)

43/143. Santa Clara Chorale

Community chorale. Open to selected students for preparation and performance in concert of works of the significant choral literature. By audition only. (1 unit/quarter)

44/144. University Orchestra

Open to selected students for preparation and performance in concert of works of the significant orchestral literature. By audition only. Lesson scholarships available to qualified students in several instruments. (1 unit/quarter)

45/145. Guitar Ensemble

Open to selected students for preparation and performance of ensemble literature for classical guitar. (1 unit/quarter)

46/146. Mission Ensemble

Student-directed, faculty-advised ensemble. Open to all students. Serves as support for selected Masses and special liturgies at Santa Clara Mission Church. Includes a broad range of literature and styles. (1 unit/quarter)

47/147. Flute Choir

All-flute ensemble; minimum of eight students required. Preparation and performance in concert of works for flute ensemble. Check with instructor for availability. (1 unit/quarter)

48/148. Chamber Music

Open to selected students for work in rehearsal and performance of chamber music. Students are encouraged to form their own groups, for direction by faculty. Check with Music Department office for available faculty chamber music coaches. (1 unit/quarter)

49/149. Accompanying

Supervised accompanying of student lessons and recitals. By permission of instructor only. (1 unit/quarter)

50/150. Instrumental Ensemble

Participation in an ensemble not included above. Students are encouraged to form a particular ensemble (percussion ensemble, brass ensemble, etc.); a faculty coach will be assigned. By permission of instructor. (1 unit/quarter)

DEPARTMENT OF PHILOSOPHY

Professors: Peter A. Facione, James W. Felt, S.J.
Associate Professors: Philip J. Kain *(Chair)*, Christopher B. Kulp, Michael J. Meyer, William A. Parent, William J. Prior, Carol J. White
Assistant Professor: Elizabeth S. Radcliffe
Austin J. Fagothey, S.J., Professor: Robert Audi

Philosophy inquires directly into the relation of human beings to the world: what we are, how we know, what values are, how we live humanly. Worth pursuing for its own sake, philosophical inquiry also promotes analytical thinking and precise expression and, thus, is excellent undergraduate preparation for a number of professional careers, such as law, government, writing, social work, and computer programing.

REQUIREMENTS FOR MAJOR AND MINOR

Students choosing philosophy as their major, in addition to the general University Curriculum requirements and the requirements for the Bachelor of Arts degree in the College of Arts and Sciences, must complete at least 12 philosophy courses including the following:

1. Four lower-division courses: Philosophy 11, 12, and 13 (Western Culture sequence) and Philosophy 25 or 27 (Logic). Philosophy majors should complete at least 11, 12, and 25 or 27 before enrolling in any upper-division philosophy courses.
2. Eight upper-division classes including four classes distributed as follows:
   a. Two historical courses selected from the following four periods: Ancient Philosophy (131); Medieval Philosophy (132); Modern Philosophy (133); and Contemporary Philosophy, which includes Existentialism (126), Analytic Philosophy (139), and Contemporary European Philosophy (170)
   b. One course in ethical theory selected from Classic Issues in Ethics (114), Political Philosophy and Ethics (115), Marx and Ethics (116), or Ethical Theory (137)
   c. One course in either Metaphysics (135) or Theory of Knowledge (136)

The minor in philosophy requires completion of Philosophy 11 and 12; 25 or 27; and any four upper-division courses. Philosophy 13 may be substituted for one upper-division course.

PRE-LAW EMPHASIS

Philosophy is one of the best majors for pre-law. The mean for philosophy majors taking the LSAT is about 8 percent higher than the mean of other departments. The Pre-Law Emphasis in Philosophy is intended to provide the skills of analytic reasoning and conceptual investigation necessary for law. Philosophical research hones the techniques of careful argumentation and logically disciplined reasoning essential to the legal analysis of cases and statutes. Also, emphasis on ethics courses will help prepare students for the study and analysis of normative issues.

The Pre-Law Emphasis may be taken as part of a philosophy major or as part of a minor, or the courses may be taken alone.

Requirements for Pre-Law Emphasis

1. One course chosen from Philosophy 25 (Informal Logic), 27 (Formal Logic), 130 (Symbolic Logic)
2. One course chosen from Philosophy 113 (Ethics and the Law), 142 (Philosophy of Law)
3. One course chosen from Philosophy 2, 5, 6, 7, 8, 9, 110, 112, 114, 115, 116, 140; 136 (Theory of Knowledge); 139 (Analytic Philosophy)
4. Two courses chosen from 1, 2, or 3 above

HONORS IN THE MAJOR

To qualify for honors in philosophy, the major ordinarily must have a 3.5 grade point average in philosophy courses and complete Philosophy 198 (Senior Research Thesis).

INTRODUCTORY-LEVEL COURSES

General Introduction

1. Introduction to Philosophy

Introduction to philosophy. Consideration of the problems raised in at least three major areas: ethics, metaphysics, and epistemology.

2. Introduction to Ethics

Consideration of the traditional theoretical questions posed in moral philosophy: standards that determine the morality of an action, the motives and consequences of an act, the good life. Authors studied may include Plato, Aristotle, Aquinas, Bentham, Mill, Kant. Satisfies ethics requirement for the bachelor's degree in all undergraduate colleges.

5. Ethical Issues in Society

Formal inquiry into normative ethics. Special attention to general ethical principles and to the practical application of these principles to current ethical issues in society. Topics may include the concepts of freedom, obligation, value, rights, justice, virtue, and moral responsibility, as applied to issues like abortion, punishment, economic distribution, racial and sexual discrimination, sexuality, political obligation, nuclear war, and pornography. Satisfies ethics requirement for the bachelor's degree in all undergraduate colleges.

6. Ethical Issues in Business

Formal inquiry into normative ethics. Special attention to general ethical principles and the application of these principles to current moral issues in business. Topics may include truth in advertising, corporate social responsibility, affirmative action, capitalism, government regulation, quality of work-life, environmental and resource issues, and ethical codes of conduct. Satisfies ethics requirement for the bachelor's degree in all undergraduate colleges.

7. Ethical Issues in Medicine

Formal inquiry into normative ethics. Special attention to general ethical principles and the application of these principles to current moral issues in medicine and the health sciences. Topics may include the definition of death, informed consent, distribution of health care, euthanasia, genetic manipulation, artificial conception, prolongation of life, and organ transplants. Satisfies ethics requirement for bachelor's degree in all undergraduate colleges.

8. Ethical Issues in Politics

Formal inquiry into normative ethics. Emphasis on moral issues in politics and/or public policy. Topics include the concepts of rights, justice, dignity, equality, personhood, desert, retributivism, and utility. Issues discussed may include alienation, individualism, community, discrimination and preferential treatment, capital punishment, abortion, pornography and censorship, sexual equality, world hunger, and animal rights. Satisfies ethics requirement for bachelor's degree in all undergraduate colleges.

9. Ethical Issues and the Environment

Formal inquiry into normative ethics. Emphasis on moral issues and the environment. Topics include animal rights; anthropocentrism; cost-benefit analysis; human rights; interspecies justice; land (use and value); population control; rights (of future generations and natural objects); values (moral and aesthetic) and preferences; wildlife protection; wilderness. Satisfies ethics requirement for the bachelor's degree in all undergraduate colleges.

Western Culture Sequence

11. Western Culture: Philosophy I, Classical & Medieval

Beginnings of Western philosophy. Representative writers of the Greek and medieval traditions, with attention to their historical and literary milieu and their relevance to contemporary thought. With Philosophy 12 and 13, satisfies Western Culture sequence requirement for the bachelor's degree in all undergraduate colleges.

12. Western Culture: Philosophy II, Early Modern

Principal fashioners of the modern mind. 17th- and 18th-century philosophers studied in the historical and literary context of their times. Their impact on the present. With Philosophy 11 and 13, satisfies Western Culture sequence requirement for the bachelor's degree in all undergraduate colleges.

13. Western Culture: Philosophy III, Modern & Contemporary

Introduction to the closer roots of modern thinking, from the critical revolution of Kant to some of the dominant currents of the 20th century. With Philosophy 11 and 12, satisfies Western Culture sequence requirement for the bachelor's degree in all undergraduate colleges. *Prerequisite: Philosophy 12 strongly recommended.*

Logic Courses

25. Informal Logic

Introduction to the art of logical reasoning. Emphasis on the ability to recognize common fallacies of argumentation.

27. Introduction to Formal Logic

Introduction to the study of deductive inference, including traditional and modern techniques.

INTERMEDIATE-LEVEL COURSES

Normal prerequisite for nonethics courses: at least one introductory-level course

109. Ethics and the Environment

Formal inquiry into normative ethics. Investigation of environmental issues from the point of view of classical ethical perspectives and consideration of how questions about the moral value of the environment provide new challenges to such classical theories. Topics may include animal rights, human rights, the rights of future generations, the rights of nature, anthropocentrism, interspecific justice, land (use and value), wilderness, and values and preferences. Satisfies the ethics requirement for the bachelor's degree in all undergraduate colleges.

110. Ethics in the Health Professions

Formal inquiry into applied ethics. Emphasis on moral issues encountered by members of the health professions. Topics may include the formulation of professional ethical standards and the examination of moral dilemmas in medicine, psychological counseling, and other areas of health care. Satisfies ethics requirement for the bachelor's degree in all undergraduate colleges.

112. Ethics in Management

Formal inquiry into applied ethics. Emphasis on moral issues encountered by managers. Topics may include the role of ethical principles in business and ethical

dilemmas raised by the management and administration of business organizations such as conflicts of interest, organizational politics, commercial bribery, whistle-blowing, labor-management conflicts, and consumerism. Satisfies ethics requirement for the bachelor's degree in all undergraduate colleges.

113. Ethics in the Law

Formal inquiry into applied ethics. Emphasis on important issues in the formation and the practice of law. Topics may include the relationship between legal and moral obligation, moral principles underlying the law, and the nature of legal reasoning. Satisfies ethics requirement for the bachelor's degree in all undergraduate colleges.

114. Classic Issues in Ethics

Exploration of the fundamental questions of ethics through close study of some of the great works of moral philosophy such as Plato's *Republic*, Aristotle's *Nicomachean Ethics*, Kant's *Groundwork*, and Mill's *Utilitarianism*. Satisfies ethics requirement for the bachelor's degree in all undergraduate colleges. *Prerequisite: upper-division standing.*

115. Political Philosophy and Ethics

Moral issues in political philosophy, especially traditional ethical justifications for political authority. Topics may include theories of political authorization and contract theory, rights, liberty, equality, justice, community, revolution, civil disobedience, and others. Specific variations include 115A (Classical and Modern), 115B (Contemporary). Satisfies ethics requirement for the bachelor's degree in all undergraduate colleges. *Prerequisite: upper-division standing.*

116. Marx and Ethics

Examination of Marx's ethical thought in the context of traditional ethical theory (Aristotle, Kant) and in relationship to his political views and philosophy of history. Topics may include alienation, the human essence, the individual, community, needs, freedom, equality, rights, and justice. Satisfies ethics requirement for the bachelor's degree in all undergraduate colleges.

117. Science, Technology, and Ethics

Investigation of the religious and ethical significance of the impact of technology on society. Satisfies ethics requirement for the bachelor's degree in all undergraduate colleges. (Also listed as Religious Studies 117.)

121. God and Philosophy

Philosophical inquiry, based on both classical and contemporary views, as to whether the existence of God can be rationally demonstrated, whether it is compatible with evil, how human beings relate to God, the nature of faith, and the nature of religious language.

126. Existentialism

General introduction to existentialism in its analysis of the basic structures of human existence, particularly freedom, and in its major thinkers. *Prerequisite: Philosophy 12 or permission of instructor.*

127. Lonergan

Examination of the work of the contemporary philosopher Bernard Lonergan and his attempt to find a new foundation for the traditional branches of philosophy and the natural and social sciences. (Also listed as Religious Studies 192.)

130. Symbolic Logic

Study of various topics in modern symbolic logic. *Prerequisite: Philosophy 27 or permission of instructor.*

131. Ancient Philosophy

Study of one major philosopher or philosophical issue (such as substance, causation, or virtue) from the ancient period. Specific variations include 131a (Socrates), 131b (Plato), and 131c (Aristotle). *Prerequisite: Philosophy 11.*

132. Medieval Philosophy

Study of one major philosopher or philosophical issue (such as universals, existence and the nature of God, or free will) from the medieval period. Specific variations include 132a (Augustine) and 132b (Aquinas). *Prerequisite: Philosophy 11.*

133. Modern Philosophy

Study of one major philosopher or issue (such as mind and body, skepticism and knowledge, or causation) from the modern period. Specific variations include 133a (Hume), 133b (Kant), and 133c (Hegel). *Prerequisite: Philosophy 12.*

134. Philosophy and Science

Exploration of selected philosophic questions that arise in contemporary science, especially physics. Topics include the nature of scientific knowing, the replacement of theories, paradoxes of relativity and quantum theory, and the sense in which scientific objects are "real."

135. Metaphysics

Examination of major issues in metaphysics. Topics may include the nature and possibility of metaphysics, free will and determinism, the mind/body problem, personal identity, and metaphysical issues arising in science. *Prerequisites: Philosophy 11, 12, and 25 or 27.*

136. Theory of Knowledge

Examination of major issues in the theory of knowledge. Topics may include justification of belief, a priori knowledge, perception, and theories of truth. *Prerequisites: Philosophy 12 and 25 or 27.*

137. Ethical Theory

Examination of major philosophers or issues in moral and social philosophy. Topics may include dignity, moral rights and obligations, justice, moral relativism, virtue, the good, and happiness. Satisfies ethics requirement for the bachelor's degree in all undergraduate colleges.

139. Analytic Philosophy

Examination of the major current in 20th-century Anglo-American philosophy. Philosophers studied may include Frege, Russell, Carnap, Moore, Wittgenstein, and Austin; movements may include logical positivism and ordinary-language philosophy. *Prerequisites: Philosophy 12, and 25 or 27.*

140. Ethics and Warfare

Historical and contemporary approaches to the ethical issues that arise in warfare. Satisfies ethics requirement for the bachelor's degree in all undergraduate colleges. (Also listed as Religious Studies 140.)

142. Philosophy of Law

Proper limits and uses of the criminal law in regulating human behavior. No philosophy prerequisite.

145. Aesthetics

Philosophical examination of the historical development of the concepts of taste and beauty.

147. Heidegger

Intensive study of the work of a major thinker of the 20th century. *Prerequisites: Philosophy 11, 12, and 13.*

ADVANCED-LEVEL COURSES

Normal prerequisites: two intermediate-level courses

170. Contemporary European Philosophy

Selected topics from 20th-century European philosophy: movements such as phenomenology and structuralism; philosophers such as Husserl, Heidegger, Merleau-Ponty, Sartre.

190. Advanced Topics in Philosophy

Selected philosophical problems studied at an advanced level.

198. Senior Research Thesis

Creation of a carefully researched and scholarly paper, under the active direction of a selected member of the department's staff. Of particular value to senior students who intend to pursue graduate studies.

199. Directed Research

Tutorial work, with demanding requirements, for advanced students in particular problem areas not otherwise accessible through courses. *Prerequisite: previous arrangement with the instructor and department chair.*

DEPARTMENT OF PHYSICS

Professor Emeritus: William A. Barker II
Professors: John B. Drahmann, William T. Duffy, Jr., Carl H. Hayn, S.J., Philip T. McCormick
Associate Professor: William R. Johanson *(Chair)*
Assistant Professor: Philip R. Kesten

The Department of Physics offers major programs of lecture and laboratory instruction leading to the Bachelor of Science in Physics and the Bachelor of Science in Engineering Physics. The department also provides an academic minor in physics and required and elective courses for students majoring in other fields.

The usual career goals of a physics major include professional scientific employment by industry, government, or a university, or secondary school teaching in physical science. The undergraduate major program in physics is appropriate preparation for graduate study in physics, astronomy and astrophysics, biophysics, environmental science, geological science and geophysics, medical physics and medicine, patent law, physical science teaching, and oceanography.

The engineering physics major, particularly appropriate for the applied science student who wishes to do research and development, covers a broad spectrum of courses in mathematics, engineering, and physics. In view of today's rapidly changing technology, the assignments of young engineers or physicists employed by industry will likely involve new technologies they have not previously assimilated. This program emphasizes, to a greater extent than the traditional engineering major, the *physics* fundamentals that are applicable to the new technologies, as well as to the more established ones.

REQUIREMENTS FOR MAJOR AND MINOR

Bachelor of Science in Physics

The physics major must fulfill the University Curriculum and College requirements and the following departmental requirements:

1. Chemistry 5 and 6
2. Mathematics 10, 11, 12, 13, 21, and 22
3. Physics 4, 5, 6, and 7 (introductory physics sequence) and associated labs
4. A series of intermediate-level courses in the subject areas of electronics, classical mechanics, electromagnetism, thermal physics, optics, mathematical physics, and quantum physics. The major program consists of Physics 70, 101, 102, 111, 112, 113, 120, 121, 122, 131, 132, and one upper-division elective from the Physics Department.
5. For graduate study in physics or related fields, additional elective physics and mathematics courses and research participation are recommended.

Physics 122 is taught as a Capstone Course.

Consult *Information for Physics and Engineering Physics Majors* regarding a special curriculum for students who are preparing for careers in biophysics, medical physics, or medicine.

For students with broad interests crossing into other disciplines, such as biology, chemistry, computer science, electrical engineering, mathematics, or philosophy, specialized curricula should be developed in consultation with the student's departmental faculty adviser.

Bachelor of Science in Engineering Physics

The engineering physics major must fulfill the University and College requirements, with the modification that this major requires a minimum of 197 quarter units in an approved curriculum. Professor Duffy is coordinator of the Engineering Physics program. Curricula are approved by the Engineering Physics Committee consisting of Professor Duffy (Physics), Professor Saad (Mechanical Engineering), and Professor Yarbrough (Electrical Engineering). The departmental program requirements are listed below.

1. Chemistry 5 and 6; Mathematics 11, 12, 13, and 21; Applied Mathematics 106 (Differential Equations)
2. Physics 4, 5, 6, 7, 70, 101, 102, 111, 112, 131, 132, and 170
3. COEN 4; ELEN 100 and 110; MECH 10, 121, and 122; CENG 43
4. Elective courses in engineering and/or science directed toward a special emphasis area (3–6 term courses)
   Example: Solid-State Science Emphasis
   - ELEN 151 (Semiconductor Devices I)
   - ELEN 152 (Semiconductor Devices II)
   - Physics 116 (Physics of Solids)
   - Physics 120 (Thermal Physics)
   - Physics 121 (Quantum Physics I)

Special emphasis areas include electronics, systems and networks, optics, energy sources and thermodynamics, materials science, solid-state science, nuclear science, and computational physics.

5. Free electives (3–4 courses)

Physics 116 is taught as a Capstone Course; although not required, it is highly recommended.

Minor in Physics

The minor in physics requires completion of Physics 4, 5, 6, and 7; and any four additional physics courses except 1, 3, 51, 20, 21, 22, 198, and 199.

PREPARATION IN PHYSICS FOR ADMISSION TO TEACHING CREDENTIAL PROGRAMS

The state of California requires that students seeking a credential to teach physics in California secondary schools either pass a subject-area examination in physical science or complete the state-approved Subject-Matter Preparation Program in physics. The credential itself requires a fifth year of study and student teaching.

The Physics Department offers courses that satisfy the requirements for the state of California Subject-Matter Preparation Program in physics. The program is similar to the physics major with some modifications. General requirements include the four-course sequence of lower-division, calculus-based physics, as well as courses in earth science, astronomy and electronics, and mechanics and electromagnetism. Education 98/198B is a recommended elective.

Students interested in the Subject-Matter Preparation Program should consult with the chair of the Physics Department at an early date.

STUDENT RESEARCH OPPORTUNITIES

Research in the department is currently funded by the National Science Foundation. Majors in physics, engineering, and engineering physics participate in faculty research projects through Physics 198 (Undergraduate Physics Research) and Physics 199 (Directed Readings in Physics). In addition, advanced students have opportunities for part-time employment assisting faculty in laboratory and related teaching activities.

LOWER-DIVISION COURSES

Note: For courses that charge fees, see the quarterly Class Schedule.

1. Physics in the Nuclear Age

The science and technology associated with the nuclear age. From the Manhattan Project to current events, a technological development of the issues of the nuclear era. Topics include nuclear fission and fusion, A-bomb and H-bomb designs, nuclear disarmament, power, and waste. Not open to majors in engineering or natural sciences. *Prerequisite: high school algebra.* (4 units)

3. Introduction to Astronomy

A brief history of the science of astronomy is followed by a thorough study of the modern theory of stellar evolution. Examination of the origin and structure of current models of the universe. Fall, winter, and spring quarters. (4 units)

4. Physics for Scientists and Engineers I

Measurement. Vectors. Straight-line kinematics. Kinematics in two dimensions. Laws of inertia, mass conservation, and momentum conservation. Center-of-mass and reference frames. Force. Newtonian mechanics and its applications. Work and kinetic energy. Potential energy and energy conservation. Rotational dynamics. Laboratory. Problem session. Spring quarter. *Prerequisites: Math 11 and 12. (Math 12 may be taken concurrently.)* (5 units)

5. Physics for Scientists and Engineers II

Gravitation. Kepler's laws. Simple harmonic motion. Fluid mechanics. Electrostatics. Gauss's law. Potential. Capacitance. Electric current. DC circuits. Kirchhoff's rules. Magnetic forces and field. Laboratory. Fall quarter. *Prerequisites: Physics 4 and Math 13. (Math 13 may be taken concurrently.)* (5 units)

6. Physics for Scientists and Engineers III

Electromagnetic induction. AC circuits. Waves. Geometrical optics. Interference, diffraction, and polarization. Thermal properties and kinetic theory of gases. Thermodynamics. Laboratory. Winter quarter. *Prerequisite: Physics 5.* (5 units)

7. Physics for Scientists and Engineers IV

Special relativity. Quantum waves and particles. Schroedinger equation. Atomic structure. Nuclear structure and decay. Statistical physics. Solids. Semiconductors. Laboratory. Spring and fall quarters. *Prerequisite: Physics 6.* (5 units)

20. General Physics I

Vectors. Newtonian laws of motion. Gravitational forces and acceleration. Momentum. Laws of equilibrium. Torques, moment of inertia, and rotational motion. Work and energy. Thermal energy, heat transfer, entropy, and thermodynamics. Noncalculus-based. Fall quarter. *Prerequisites: basic algebra and trigonometry.* (4 units) Students graduating in 1994 receive upper-division credit.

21. General Physics II

Fluid statics and dynamics. Elastic deformations. Vibrations and wave motion. Superposition principle. Sound. Optics. Relativity. Laboratory. Winter quarter. *Prerequisite: Physics 20.* (5 units) Students graduating in 1994 receive upper-division credit.

22. General Physics III

Electricity and magnetism. Ohm's law. Coulomb's law. Electric fields and potential. D-C circuits. Capacitors. Faraday's law. A-C circuits. Wave-particle duality. Atomic and nuclear physics. Quantum mechanics. Laboratory. Spring quarter. *Prerequisite: Physics 21.* (5 units) Students graduating in 1994 receive upper-division credit.

51. Introduction to Earth Science

Overview of geology and its significance to man. Earthquakes, volcanism, plate tectonics and continental drift, rocks and minerals, geologic hazards, mineral resources. Emphasis on basic geologic principles and the role of geology in today's world. Winter quarter. (4 units)

70. Electronic Circuits for Scientists I

Linear electric circuits. Phasor analysis, transients, and Fourier series. Network theorems. Junction diodes, bipolar junction transistors, and field-effect transistors. Laboratory. Spring quarter. *Prerequisite: Physics 6.* (5 units)

UPPER-DIVISION COURSES

Note: For courses that charge fees, see the quarterly Class Schedule.

101. Analytical Mechanics I

Review of vectors, vector calculus, and coordinate transformations. Particle kinematics and Newtonian dynamics. Oscillations. Central forces. Systems of particles. Fall quarter. *Prerequisite: Physics 4.* (5 units)

102. Analytical Mechanics II

Rigid body mechanics. Calculus of variations. Methods of Lagrange and Hamilton. Stability and coupled oscillators. Elastic bodies. Winter quarter. *Prerequisite: Physics 101 or Civil Engineering 42.* (5 units)

111. Electromagnetic Theory I

Electrostatic fields. Laplace's and Poisson's equations. Dielectrics. Magnetic fields of steady currents. Induced electromotive forces. Magnetic energy. Magnetic materials. Winter quarter. *Prerequisite: Physics 6.* (5 units)

112. Electromagnetic Theory II

Maxwell's equations. Plane waves in free space and in matter. Reflection and refraction. Interference and diffraction. Polarization. Guided waves. Radiation of electromagnetic waves. Spring quarter. *Prerequisite: Physics 111.* (5 units)

113. Optics

Geometrical optics. Interference. Fraunhofer and Fresnel diffraction. Optical instruments. Polarization. Crystal optics. Selected topics from contemporary optics. Laboratory. Winter quarter. Offered alternate years. Offered alternate years. *Prerequisite: Physics 6.* (5 units)

116. Physics of Solids

Crystal structure. Phonons. Free electron theory of metals. Band theory of solids. Magnetism. Superconductivity. Spring quarter. *Prerequisites: Physics 7 and senior standing.* (5 units)

120. Thermal Physics

Laws of thermodynamics with applications to ideal and non-ideal systems. Elementary kinetic theory of gases. Entropy. Classical and quantum statistical mechanics. Selected topics from magnetism and low-temperature physics. Winter quarter. Offered alternate years. *Prerequisite: Physics 7.* (5 units)

121. Quantum Physics I

Thermal radiation. Wave-particle duality. Bohr atom. Schroedinger wave mechanics. One-electron atoms. Atomic moments, spin, and transitions. Multielectron atoms. Hartree theory. Optical excitations. Zeeman effect. Laboratory. Fall quarter. *Prerequisites: Physics 7 and 102.* (5 units)

122. Quantum Physics II

Molecules, bonding, and spectra. Nuclear models and structure. Nuclear decay and reactions. Elementary particles and quark theory. Strong and weak nuclear forces. Laboratory. Winter quarter. *Prerequisite: Physics 121.* (5 units)

131. Methods of Mathematical Physics I

Linear vector spaces. Coordinate transformations. Eigenvalue problems. Abstract formalism of vector spaces. Legendre functions. Bessel functions. Function spaces and expansions in orthogonal sets. Spring quarter. *Prerequisite: Math 22 or Applied Math 106.* (5 units) NCX†

† Exempted from challenge

132. Methods of Mathematical Physics II

Functions of a complex variable as mappings. Basic properties of analytic functions. Series expansion of complex functions. Poles on the contour. Analytic continuation. Contour integration. Method of steepest descent. Transform techniques and conformal mapping. Dispersion relations. Fall quarter. *Prerequisite: Physics 131.* (5 units) NCX†

170. Electronic Circuits for Scientists II

Voltage and power amplifiers. Logic gates and digital circuits. Small-signal models. Feedback and waveform generation. Operational amplifiers. Laboratory. Fall quarter. *Prerequisite: Physics 70.* (5 units)

198. Undergraduate Physics Research

Departmental work under close professorial direction on research in progress. Permission of the professor directing the research must be secured before registering for this course. Restricted to physics majors, engineering physics majors, and honors students with a 3.0 or higher grade point average. Fall, winter, and spring quarters.

199. Directed Reading in Physics

Detailed investigation of some area or topic in physics not covered in the regular courses; supervised by a faculty member. Permission of the professor directing the study must be secured before registering for this course. Restricted to students with a 3.0 or higher grade point average. Fall, winter, and spring quarters.

† Exempted from challenge

DEPARTMENT OF POLITICAL SCIENCE

Professors: Dennis R. Gordon, Eric O. Hanson *(Chair)*
Associate Professors: Jane Leftwich Curry, Janet A. Flammang, Timothy J. Lukes, Peter I. Minowitz, William J. Stover
Assistant Professors: Jesús Martínez-Saldaña, Terri Peretti

The Department of Political Science introduces students to the political aspects of society and the analysis of political behavior, values, institutions, and government. It also offers preparation for various graduate and professional studies and careers in public service. Special emphasis programs are available to political science majors in pre-law and public administration.

REQUIREMENTS FOR MAJOR AND MINOR

In addition to the general University Curriculum and College requirements, a student majoring in political science must satisfactorily complete the following:

1. Two mathematics courses, selected from one of the following:
   a. Mathematics 6 (Finite Mathematics for Social Science) and 7 (Calculus for Social Science)
   b. Mathematics 11 and 12 (Calculus and Analytic Geometry I and II)
   c. Mathematics 6 (Finite Mathematics) and 8 (Introduction to Statistics)
   d. Mathematics 11 (Calculus and Analytic Geometry I) and 8 (Introduction to Statistics); other statistics courses may replace Mathematics 8.
2. Eleven term courses in political science:
   a. Political Science 1, 2, 25, 30 (taken during the freshman and sophomore years, preferably in sequence)
   b. Seven upper-division courses in political science. Of these seven courses, one must be a lecture course from each of these four areas of political science: U.S. Politics, Comparative Politics, International Relations, and Political Theory and Methodology.
3. A political science seminar taken during the senior year from among the seven upper-division courses
4. An average grade of C or higher in political science courses

The minor in political science requires completion of any three lower-division political science courses, three upper-division courses, and a seventh upper- or lower-division course. Students should note lower-division prerequisites for upper-division courses in Political Theory and Methodology, International Relations, Comparative Politics, and U.S. Politics.

SPECIAL EMPHASIS PROGRAMS

Political science majors may select one of two emphasis programs. These are not narrow specializations, but aim at a particular competence within the major program. The completion of a special emphasis program may be noted on a student's transcript if the student notifies the department chair and the chair approves the notation. Detailed programs of study listing recommended courses for each emphasis may be obtained from the department chair.

Pre-Law

The program is available to those political science majors considering graduate study in law and legal careers.

Public Administration

The program combines political science with courses dealing with the enactment of public policy. It is available to those majors planning careers in public service or business.

POLITICAL SCIENCE HONORS PROGRAM

The Political Science Honors Program enhances the regular major by providing a more specialized course of study to prepare highly qualified students for

graduate study in the social sciences. All majors with a GPA of 3.0 or higher in the lower-division sequence are eligible to apply. A maximum of 15 students per year are admitted. Admission is determined on the basis of course work, recommendations, and a personal interview with the faculty director.

Participants in the department Honors Program must meet the following requirements:

1. Foreign language: Complete the foreign language appropriate to the student's academic and vocational interests through the intermediate level.
2. Internship: Complete one of the internships available to political science majors (see External Programs, below).
3. Honors seminar: Complete the Honors section of Political Science 169 or another approved course in political behavior.
4. Economics: Complete a course in macro- or microeconomics.
5. Honors activity report: During the spring quarter of their senior year, department Honors students must submit an activity report describing their contributions to political science at Santa Clara.
6. Department contribution: Honors students are expected to participate in various department-sponsored events, and one representative from the program has full voting status in the department's faculty deliberations.

Interested students should consult their adviser and/or the department chair.

PREPARATION IN POLITICAL SCIENCE FOR ADMISSION TO TEACHING CREDENTIAL PROGRAMS

The state of California requires that students seeking a credential to teach government in California secondary schools either pass a subject-area examination in social science or complete the state-approved Subject-Matter Preparation Program in government. The credential itself requires a fifth year of study and student teaching.

The Political Science Department offers courses that satisfy the requirements for the state of California Subject-Matter Preparation Program in government. The program is similar to the political science major with some modifications. Education 98/198B is a recommended elective.

Students interested in the Subject-Matter Preparation Program should consult with the chair of the Political Science Department at an early date

EXTERNAL PROGRAMS

The Political Science Department makes available to qualifying students opportunities to participate in a variety of programs that combine practical field experience and academic credit.

These programs involve many levels of political activity:

1. On the international level, the department sponsors a United Nations Program with participation open to all undergraduate students. Students in the Model U.N. may elect to take Political Science 26 for 2 units of credit. Ad-

ditionally, students may study at the United Nations itself through a program with Drew University in New York.

2. On the national level, Santa Clara is a member school of American University's Washington, D.C., program, in which students receive credit for internships and intensive seminars at the national capital.
3. On the state level, Santa Clara is affiliated with the Capital Campus Program at the University of California, Davis. It is much like the Washington program, except it focuses on state government.
4. On the local level, the department assists students in arranging academic credit for internships in local politics. Students may work for government agencies, legislative or judicial bodies, political parties, or politically related groups. From time to time, the department offers courses that combine local internships with classroom work.

LOWER-DIVISION COURSES

1. Introduction to U.S. Politics

Critical analysis of U.S. political values, institutions, and processes. America's political tradition, the Constitution, the presidency, Congress, the bureaucracy, Supreme Court, elections, political parties, interest groups, mass media, domestic policies, and foreign policy.

2. Introduction to Comparative Politics

Government and politics in several modern states. Emphasis on the development of analytical abilities and critical skills in the evaluation of political culture, processes, and institutions.

25. Introduction to International Relations

Conceptual models used to analyze international relations, contemporary problems of world politics, and the methods states use to provide peace and security.

26. International Organization Laboratory

Students simulate U.N. operations by representing member-nations, debating and preparing resolutions, and engaging in other aspects of diplomacy. Open to all undergraduates. Students participating in the Model U.N. are encouraged to take this course. May be repeated for credit. (2 units)

30. Introduction to Political Theory

An exploration of some of the principal themes and questions of political theory through the writings of Plato, Machiavelli, Marx/Engels, and Mill. Prominent themes include theory and practice, individual liberty, morality and politics, freedom, obligation, and justice.

40. Social Forces in Politics[§]

Impact of social movements on political change. Goals and means of women and minority movements as well as the political aspects of changing lifestyles.

45. Criminal Justice System

Basic understanding of the U.S. criminal justice system: police, courts, probation, imprisonment, parole, relations with other governmental agencies. Goals, successes, and failures of the system, and possible remedies.

50. World Geography

Provides an understanding of world geography through an appreciation of contemporary global problems. Problems include

[§] Course included in Ethnic Studies program

the environmental crisis, international relations, demographic trends, and economic development. Special emphasis on world hunger and the roots of Third World poverty. (Also listed as Anthropology 50.)

90. Selected Studies in Public Policy

Introduction to the formulation and implementation of selected public policies in domestic or foreign policy areas.

UPPER-DIVISION COURSES

Prerequisites for all upper-division courses:

1. For *Political Theory and Methodology* courses, 30 is required.
2. For *International Relations* courses, 25 is required.
3. For *Comparative Politics* courses, 2 is required.
4. For *U.S. Politics* courses, 1 is required.
5. For *Senior Course Work* at least one upper-division lecture course in 1–4 above of the seminar, practicum, or directed reading course is required.

Note: In special cases, the instructor of a particular course may make an exception to these requirements.

Political Theory and Methodology

103. Approaches to the Study of Politics

Theoretical examination of different approaches to the study of politics. Competing theories, paradigms, and types of evidence in the social sciences. Representative methodologies for political research.

108. Catholic Political and Social Thought

Survey of Catholic theories of church-state relations in history and at present. Catholic thought on state authority, forms of government, and purposes of society and the state. Evaluation of socialism, capitalism, and liberalism, from the Catholic viewpoint of nature and destiny of the human person.

111. History of Political Theory I: Greek and Christian

Development of Western political thought from its Greek origins in the work of Plato and Aristotle through the work of Aquinas.

112. History of Political Theory II: Liberalism and Its Roots

Continuation of 111. Western political thought from Machiavelli through the origins of liberalism in the writings of Hobbes, Locke, and Rousseau.

113. History of Political Theory III: Post-Liberal Theories

Writers and themes in 19th- and 20th-century political thought including Marx, Nietzsche, Freud, and Lenin.

117. American Political Theory I: The Puritan Founding to the Civil War

Development of American political thought from the Puritan period through the reconstruction of the American political and social order following the Civil War. Conceptions of freedom, privacy, and public order, in the context of the racial, social, and economic development of the American Republic.

118. American Political Theory II: The Civil War to the Present

Development of American political conceptions from the late 19th century to the present. Focus on questions of social order, the role of the state, violence and social reform, racial and industrial justice, and the future of politics in an industrial and urban society.

International Relations

124. Contemporary Issues in U.S.-Mexico Relations

A multidisciplinary examination of the political, economic, and sociocultural relations between the United States and Mexico, including the most significant contemporary issues of agreement and disagreement. Discussion of the interpretations formulated by Chicanos, Mexican immigrants, and other sectors with transnational ties. (Taught as part of SCU's summer program in Mexico in conjunction with the National Autonomous University in Mexico.)

125. International Law

Sources, nature, and functions of international law in world politics. Special attention to the subjects of international law, international transactions, and the rules of war. Viewpoints presented from Western, socialist, and Third World perspectives.

126. International Organization

International organization in world affairs. Political, economic, and social role of the United Nations, regional organizations, specialized agencies, and nonstate transnational actors.

127. Comparative Foreign Policies

Comparative study of the foreign policies of selected nation-states. Interaction of international and domestic politics in foreign policy formulation and implementation.

128. U.S. Foreign Policy

Aims, formulation, and implementation of U.S. foreign policy since World War II, especially toward Russia, Europe, China, Japan, Latin America, and other nations and regions.

129. Foreign Policy of New Democracies

A comparative study of how states in transition, such as the former Soviet Union and Eastern Europe, develop new foreign alliances and deal with other states.

130. Technology and Development in the Third World

Consideration of the relationship between technology and development in selected Third World nations. Subjects include technology and import substitution, technology and state power, technology and debt, and the search for alternate technologies to meet basic human needs.

135. Far Eastern International Relations

International political developments in the Far East from 1900 to the present. Analyses of the geographic environment, political forces, and the impact of differing cultures on governmental decision making. *Prerequisites: Political Science 2 and 25.*

Comparative Politics

131. The Military in Politics

The political role of the military in developed and developing societies, using a variety of states as examples. In developing societies, topics include causes of military intervention, legitimacy-building efforts, and withdrawal from politics.

136. Politics in Central America and the Caribbean

Political cultures, processes, and institutions of Mexico and selected Central American and Caribbean states. Governmental organization, dependency, development, and political violence.

137. Politics in South America

Political cultures, processes, and institutions of selected South American nations. Government, dependency, development, and political violence.

138. Politics in South Africa

Examination of the politics in South Africa, historically and in the context of that nation's interaction with the world community. Topics include politics prior to apartheid; the establishment of apartheid and the growth of the African National Congress; the meaning of Soweto uprisings and recent government policies; and questions of divestment, sanctions, and the future of apartheid.

139. Religion and Politics in the Third World

A comparison of the relationships between religion and politics in Asia, Latin America, and the Middle East. Emphasis on the current political influence of traditional organization and belief.

140. Politics in Less Developed Countries

Multidisciplinary study of the problems and politics of political development in Latin America, Africa, and/or Asia. Case studies of communist and capitalist approaches to political development. Impact of international politics on internal development.

141. Comparative Study of Democracy

An examination of democracy-building in formerly authoritarian states and of the special political structures democracies create to preserve themselves.

142. Politics in the Middle East

Designed to give students an understanding of the complexities of Middle East politics, the importance of the region to the world, and the role history and religion have played in the political and social development of the various countries in the region.

143. Executives, Public Policy, and Change in Europe

An examination of the policy process in selected European states and their responses to the end of communism and the rise of issues such as nationalism and economic transformation.

144. Political Participation and Governments in Europe

An examination of selected states in Europe and the European commonwealth in terms of popular participation, party structures, and other participation systems. Analysis of the model systems of rule in Western Europe and the former communist states.

145. Politics of Former Communist States

An examination of the communist era in the former Soviet Union and the transformation that resulted from its failures. Emphasis on political economy, ethnic relations, and the development of democratic institutions in the new states.

146. African Politics

The problems of nation-building and economic development in sub-Saharan

Africa. Case studies of Kenya and Tanzania.

147. Politics in Japan

Political history, institutions, and interest groups of modern Japanese political culture.

148. Politics in China

Origins of revolution in modern China, the politics of social and economic modernization in China since 1949, the problems of bureaucratization and political participation and the succession to Mao Zedong.

149. Comparative Political Systems

Selected public policies in economically advanced societies. Relationship of political culture to social and economic behavior.

U.S. Politics

150. The Presidency

Analysis of the presidency as it has evolved throughout U.S. history. Comparison of presidential powers with those of Congress, the courts, the bureaucracy, the press, political parties, and the public.

151. The Congress

History, structure, and policies of Congress. Congressional elections and theories of representation, the committee system and congressional norms, lobbying, congressional ethics and reforms, and the power of Congress relative to the president and the bureaucracy.

152. Political Participation

An examination of who participates in U.S. politics and the various forms of political participation. Elections, political parties, interest groups, community organizing, and political protest.

153. Ethnic Politics[§]

A multidisciplinary and comparative analysis of the political experiences of Chicanos, African Americans, Asian Americans, and Native Americans. Emphasis on their relationship to the social, political, and economic structures at the local and national levels. Includes discussion of the interpretation of race/ethnic relations in the United States.

154. Women and Politics[‡]

A consideration of the various ways women have changed "politics as usual." Examination of the status of women today (what has been accomplished and what remains to be done), varieties of feminist thought, women as voters and as an interest group, and women in public office.

155. Political Economy

Introduction to the relationship of the state to the private market distribution of resources and the achievement of individual and aggregate economic goals. Classical ideas of political economy, the functioning of capitalist and socialist political-economic systems, the role of the state and multinationals in the world and domestic economy, domestic fiscal and monetary policy, and the phenomena of imperialism and corporate power.

156. Politics and Mass Media

Impact of mass media on political values, attitudes, and behavior. Various forms of mass communication: print, graphic art, and film. Special attention to television.

157. U.S. Constitutional Development

Historical evolution from 1607 to 1890. English and colonial constitutional her-

‡ Course included in Women's Studies program § Course included in Ethnic Studies program

itage; the U.S. Constitution; landmark cases interpreting the Constitution; the nature of the Union, slavery, the Civil War; and the rise of judicial restraints on legislative economic regulation.

158. The Constitution and Capitalism

Constitutional law doctrines and decisions concerning economic liberty and property rights. Emphasis on the relationship between U.S. liberal constitutional principles and capitalist economic development and on the battle between FDR and the Supreme Court over the constitutionality of New Deal economic programs.

159. The Constitution and Liberty

Constitutional law doctrines and decisions regarding civil liberties. Topics include free speech and association, freedom of the press, religious freedom, and reproductive freedom.

160. The Constitution and Equality

Constitutional law doctrines and decisions regarding equal protection of the laws. Topics include race discrimination (particularly school desegregation and affirmative action), sex discrimination, discrimination against the poor, and discrimination based on sexual orientation. The shift from Warren Court liberalism to Rehnquist Court conservatism with regard to racial equality in education and employment.

161. Law and Politics in the United States

Examination of the U.S. legal system, its distinctive features and strengths and weaknesses. Topics include legal culture, the adversary system and its alternatives; system participants (litigants, lawyers, and judges); and legal versus political influences on judicial decision making. Special attention to the question of the capacity of courts to serve as agents of social change.

162. Urban Politics

Examination of political processes in the U.S. city. Special attention to the structures and institutions of urban political power and the changing forms of political action. Discussion of the historical development of urban social life, political cultures, racial/ethnic and class communities, political economy, and urban planning.

163. State and Local Politics

A consideration of the politics and processes of state and local governments, with particular attention given to California state, county, and municipal politics. Topics include federalism, executives, legislatures, courts, interest groups, parties, elections, financing, and issues such as education, welfare, criminal justice, transportation, housing, and urban growth.

165. Public Administration

Administration of public policies in terms of broad questions of democratic theory. Organizational theory, public employees, budgetmaking, policy evaluation, and public finance.

166. Special Topics in Public Administration

Various public administration topics, often making use of experts outside the University. Public sector labor relations, public budgeting and finance, administration of county and city government, and public personnel policies.

167. The Making of Public Policy

An examination of the nature of U.S. public policy and policy analysis; public policy-making stages (agenda setting, legislative legitimation, implementation, budgeting, and evaluation); and substan-

‡ Course included in Women's Studies program § Course included in Ethnic Studies program

tive policy issues such as economics, poverty and social welfare, health, education, energy, environment, defense, criminal justice, gender, and housing. A comparison of U.S. policies with those of other advanced industrial nations.

168. Special Topics in Public Policy

Selected topics and problems in public policy.

169. Political Behavior

Emphasis on exploring characteristics of the U.S. electorate, with special attention to analyzing factors that prompt individuals to vote in particular ways. Techniques of quantitative political analysis. Computerized manipulation of survey research data.

Senior Course Work

183. Seminar in Comparative Politics

Selected topics in comparative politics in various states and regions.

184, 185. Seminar in U.S. Politics

Selected topics and problems in the American political process.

190. Seminar in Research Methods

Planning and conduct of political science research on selected topics such as political communication and socialization.

191. Seminar in Political Theory

Analysis of selected political philosophers or particular themes in political philosophy.

192. Seminar in Political Theory

Discussion and analysis of the relationship between politics and aesthetics. Special emphasis on the aesthetic theories of Kant, the Dadaists, the Socialist Realists, and Herbert Marcuse.

193. Seminar in World Revolutionary Forces

Theories of revolution that deal with the psychological, social, and political aspects of change. Studies of revolutionary movements and societies.

196. Seminar in International Relations

Selected aspects of international political behavior.

197. Seminar in Civil Liberties

Students undertake an in-depth study in a particular civil liberty of their choice.

198. Public Service Internships

Directed internships in government agencies, legislative bodies, political parties, or interest groups. Open to qualified juniors or seniors with permission of the instructor.

199. Directed Reading

Independent study. Intensive work in areas not fully covered in upper-division courses. Written outline of the proposed course, with signatures of the sponsoring instructor, department chair, and dean of the College approving the course, must be submitted to the Office of the Dean at least one week prior to registration. The student's copy of the approved form must be presented when the student registers. Forms are available at the Registrar's Office.

DEPARTMENT OF PSYCHOLOGY

Professors: Jerry M. Burger, Stephen S. Fugita, Robert Numan *(Chair)*, Marvin L. Schroth, Eleanor W. Willemsen
Associate Professors: Roland C. Lowe, Gerdenio M. Manuel, S.J.
Assistant Professors: Karen M. Anderson, Tracey L. Kahan

Psychology is the study of behavior, emotion, and thought using techniques modeled on the scientific method. At the undergraduate level, the study of psychology is part of a liberal education; a major in psychology lays the groundwork for various advanced studies, including the pursuit of the doctoral degree needed for the professional practice of psychology. The department offers introductory courses in each major area of the discipline and courses in psychological methods.

REQUIREMENTS FOR MAJOR

Students majoring in psychology must fulfill the University Curriculum and College requirements and satisfactorily complete the following courses:

Lower-Division Courses in Psychology (4 courses)

1. Psychology 10, 11, and 40
2. Psychology 42 or 43

Lower-Division Courses Outside of Psychology (3 courses)

1. Mathematics 6 (Finite Mathematics for Social Science) and 7 (Calculus for Social Science) or Mathematics 11 and 12 (Calculus and Analytic Geometry I and II)
2. Biology 9 (Human Biology)

Upper-Division Courses in Psychology (7 courses)

1. Two courses related to Psychology 10 (Psychology as a Natural Science) from among 112, 120, 130, 131, and 165
2. Two courses related to Psychology 11 (Psychology as a Social Science) from among 115, 145, 150, 160, and 185
3. Three additional elective upper-division psychology courses

SPECIAL EMPHASIS PROGRAMS

Special Education or Teaching

Psychology majors who wish to go into special education or elementary teaching must satisfy the Bachelor of Science and departmental requirements and complete a liberal studies program in accordance with current state requirements. In-

terested students must submit a formal proposal to Dr. Eleanor Willemsen and the University's adviser for teacher credentials prior to or early in the junior year.

Psychobiology

In addition to the Bachelor of Science and departmental requirements, students who wish to study neuroscience may elect the psychobiology concentration. The following requirements incorporate the psychology major:

1. Mathematics 11 and 12 (Calculus and Analytical Geometry I and II)
2. Chemistry 5 and 6 (General Chemistry I and II) and 35 and 36 (Organic Chemistry I and II)
3. Biology 91 (Populations), 92 (Physiology), 93 (Cells), 101 (Vertebrate Anatomy), and 124 (Animal Physiology)
4. Psychology 10, 11, 40, 42 or 43, 130, 165 or 166; two courses from 115, 150, 160, and 185; and three additional elective, upper-division psychology courses
5. Biology 7 (From Synapses to Symptoms) and 165 (Animal Behavior) are recommended, but not required.

Gerontology

In addition to the Bachelor of Science and departmental requirements, students who wish to study the elderly may take Biology 187, a Practicum in Aging, and at least three courses selected from Anthropology 172, Political Science 149, Psychology 188, Psychology 196, and Sociology 172.

Professional Psychology

The Department of Psychology provides a special program for students demonstrating exceptional scholastic promise and the desire to continue the study of psychology in graduate school. For those students, the department recommends that the following be included as part of the overall psychology program:

1. Psychology 42, 105, 165, and 170
2. Attendance at special departmental seminars
3. Participation in ongoing faculty research
4. An independent research project in the senior year
5. Related courses in other departments selected in consultation with the student's adviser

LOWER-DIVISION COURSES

Note: For courses that charge fees, see the quarterly Class Schedule.

5. Honors Colloquium

Restricted to students in the University Honors Program. The honors version of Psychology 10. Available only in alternate years.

6. Honors Colloquium

Restricted to students in the University Honors Program. The honors version of Psychology 11. Available only in alternate years.

10. Psychology as a Natural Science

Scientific study of human and animal behavior, including the physiological basis of behavior, perception, learning, memory, motivation, and emotion. Other topics may include language, problem solving, sleep, and dreaming.

11. Psychology as a Social Science

Principles of human development, intelligence, abilities, personality, psychological measurement, and sociopsychological influences on behavior. Introductory exposure to research methodology and statistical techniques.

36. Gender in Human Development‡

The ways in which societal phenomena (sex roles, sex prejudice) interact with intrapsychic phenomena related to gender (gender identity, masculinity, femininity) and influence individual development through the life span. Topics include children's acquisition of gender identity, masculinity and femininity in personality, women's career development, marriage and divorce, parenting, schools and sex roles, mental health and sex roles, and aging and sex roles.

40. Statistical Data Analysis

Exercises designed to teach the skills of statistical data analysis and technical writing in psychology. *Prerequisite: Math 6 or 11.*

42. Experimental Psychology

Basic principles and methods of experimental psychology. Emphasis on the experimental method, but other methods (e.g., naturalistic observation) are discussed. Analysis and application of group and single-subject experimental designs. Survey of the learning and the sensation and perception literature. Application of lecture material in the laboratory: the conduct of a number of experiments using human and animal subjects. Lectures and laboratory. *Prerequisites: Psychology 10 or 11 and 40.*

43. Research Methods in Psychology

Investigation of methods of psychological research and issues involved in the collection of data. Emphasis on the social, personality, and developmental areas of psychology. Exercises require designing research projects, collecting data, and writing professional reports. *Prerequisites: Psychology 10 or 11 and 40.*

50. Psychology of Adjustment

Introduction to the psychology of personal and social adjustment. Personality patterns of the individual in various contexts, such as the family, the school, marriage, the adolescent years, and social relations. Relationship of sex roles to the individual.

80. Child Psychology

Development from birth to puberty. Intended primarily for nonmajors and majors who will not be taking the Psychology 185, 186, 187 sequence. Students may not receive credit for both 80 and 185. *Psychology 10 or 11 recommended.*

85. Human Sexuality

Human sexual behavior. Adult sexual behaviors; biological aspects of sexual behavior; developmental aspects of sexuality, homosexuality, reproduction, sexual deviations, dysfunctions, and therapy. Sexual abuse and legal and social issues.

‡ Course included in Women's Studies program

UPPER-DIVISION COURSES

Note: Prerequisites for all upper-division courses, in addition to those listed for specific courses, are 10 or 11; 40; 42 or 43; or permission of instructor. Non-majors are encouraged to seek permission of instructor. For courses that charge fees, see the quarterly Class Schedule.

105. Statistics and Experimental Design II

Advanced topics in theory and methods of statistical analysis and experimental design. Complex analysis of variance, multiple correlation and regression, factor analysis, and an introduction to nonparametric statistics.

112. Motivation and Emotions

Scientific study of the various motivational-emotional processes of people and higher animals. Biological drives, psychological survival needs, altered states of consciousness, social motives, and theories of emotion.

113. Sports Psychology

An overview for preparing a person psychologically to be active in sports. Ways for athletes to maximize their potential as well as ways to activate nonathletic individuals to be involved in sports. Topics include drug abuse by athletes; children and sports; team cohesiveness; sport injuries; fitness and health; anxiety and competition; women and sports; and race, ethnicity, and sport.

115. Introduction to Abnormal Psychology

Comprehensive consideration of the major forms of mental disorder with regard to their etiology, nature, development, and therapy. Emphasis on current theories of mental dysfunction and the psychology of abnormal thinking.

117. Health Psychology

Ways in which principles of psychology can be employed to help medical patients. Psychosocial factors influencing the disease process. Application of learning, cognitive, and motivational principles to health care delivery, prevention of disease, and attainment of wellness. Available only in alternate years.

118. Advanced Topics in Clinical/Abnormal Psychology

An in-depth study of major mental illness and its treatment. Topics include disease prevention, community care, diagnosis, assessment, multimodal treatment, etc. Three hours per week of volunteer clinical work required. *Prerequisite: Psychology 115 or 117.*

119. Minority Mental Health[§]

Examination of the mental health and well-being of U.S. minority groups. Topics include culture and discrimination, measurement and training, and service delivery.

120. Perception

A theoretical and empirical investigation of human perceptual processes, with an emphasis on visual perception. Topics include psychophysiology of vision; perceiving visual space (shape, contrast, orientation, distance, depth, motion); color perception; perceptual illusions; development of perception; imagining vs. perceiving; effects of knowledge on perception; perception in "novel" environments.

130. Psychology of Learning and Thought Processes

Survey of the experimental literature on the basic forms of the learning process from animals to humankind. Latest theories on memory and thought processes.

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§ Course included in Ethnic Studies program

131. Cognitive Psychology

The information-processing approach to how we pay attention to, perceive, remember, discuss, and think about the world around us. Includes the history of the discipline and the following research areas: consciousness and attention, perception, memory, psycholinguistics, and problem solving. Emphasis on the experimental methods that have been developed to study cognition.

132. Advanced Cognitive Psychology Seminar

Selected topics representing current research in cognitive psychology and cognitive science. Emphasis on contemporary models and issues related to human memory processes, including such real-world applications as eyewitness testimony, memory disorders (e.g., Alzheimer's, Korsakoff's), autobiographical memory, reality monitoring, and "feeling of knowing." Students required to research, present, and discuss topics in an informal setting. Available only occasionally. *Prerequisite: Psychology 131.*

135. Psychology of Sleep and Dreams

An empirical investigation of the nature of sleep and dreams. Emphasis on physiological, cognitive, and functional approaches. Topics include psychophysiology of sleep and dreams; theories of sleep (especially REM sleep) and dream function; continuity in mental processes during the sleep/wake cycle; memory for dreams; types of dreams; consciousness and dreaming; lucid dreaming.

145. Clinical Assessment

Principles and problems of measurement in psychology, i.e., tests of attitudes, aptitudes, and personality. Students construct, administer, score, interpret, and evaluate tests. Interviewing and counseling skills.

150. Social Psychology

The scientific investigation of social behavior. Topics include communication, attraction, person perception, attitude change, aggression, altruism, and group behavior.

151. Seminar in Social Psychology

Small-group class. Special topics in social psychology. Research and reading of current literature. Articles dealing with current theoretical and methodological issues in social psychology. Available only occasionally. *Prerequisite: Psychology 150.*

152. Social-Clinical Psychology

The interface between social psychology and clinical psychology. Emphasis on how theory and research from social psychology can be used to better understand topics of interest to clinical psychologists, including personal adjustment and well-being, coping, abnormal behavior, clinical diagnosis, and the effects of psychotherapy.

154. Psychology of Language

Examination of the mental processes involved in using language, the behaviorist and neobehaviorist accounts of language, the linguists' strong reaction against these explanations, and the information-theory approach to the study of language. Topics include the biological foundations of language, human language vs. animal communication, the perception and production of speech sounds, the representation of words and concepts in memory, the syntax and meaning of sentences, the development of language in children, language comprehension, and the relationship between language and thought.

156. Prejudice and Discrimination[§]

Examination of structural and individual level theories of prejudice and discrimination as they relate to race and ethnicity and gender and sexual preference. Topics

[§] Course included in Ethnic Studies program

include integration, social mobility, racism and sexism on campus, and research in minority communities.

157. Organizational Psychology

Effects of organizational structure on individual and group behavior. Principles of behavior that may be applied to various large organizations, such as corporations, universities, and hospitals. Job satisfaction, group decision making, power, leadership, and communication.

159. Religion in the Theories of Freud and Jung

See Religious Studies 159.

160. Theories of Personality

Critical analysis of major theories of personality. Emphasis on therapeutic and research implication. Considerable attention to the development of theory construction and analysis skills. Theories of Freud, Jung, Adler, Rogers, Sullivan, Kelly, Bandura, and others.

161. Advanced Topics in Personality

For advanced students interested in pursuing specific topics in personality, e.g., consciousness, personality development, anxiety, frustration, aggression, and psychoanalytic psychology. Available only occasionally. *Prerequisite: Psychology 160.*

165. Physiological Psychology

Emphasis on the neuroanatomical, neurochemical, and neurophysiological correlates of motivation, emotion, learning, and memory. Neural regulation of sleep and arousal, mechanisms of drug action, and neuropathology. Brain anatomy and application of physiological techniques to the study of animal behavior. Lectures and laboratory.

166. Human Neuropsychology

The study of human brain function from a clinical and experimental perspective. Students presented with a general view of brain organization and function and then introduced to the neurological exam and clinical tests. Subsequent topics include principles of cerebral asymmetry; functions of the frontal lobes; psychiatric disorders; and brain mechanisms involved in emotion, spatial behavior, memory, and language.

170. History and Systems of Psychology

Origin and development of modern psychological approaches. Psychoanalysis, behaviorism, Gestalt, humanism, and existentialism. Emphasis on conceptual issues.

175. Humanistic Psychology

Historical and conceptual roots of humanism. Implication of the "third force" for therapy, community living, education, and research. Special attention to humanistic psychotherapies and the application of humanistic principles to education. Three hours per week of community volunteer work required.

182. Seminar in the Psychology of Motivation

Series of assigned readings and reports from classic and contemporary sources in the experimental and theoretical literature on motivation. Investigation of special problems. *Prerequisite: Psychology 112 or special permission.* NCX†

184. Seminar in the Psychology of Learning

Series of assigned readings and reports from classic and contemporary sources in the experimental and theoretical literature on learning and thinking. NCX†

† Exempted from challenge

185. Developmental Psychology I

First course in a sequence of courses that explores the development of individuals during the life cycle. Topics for the sequence include (1) principles and theories of development; (2) perceptual, cognitive, social, and personality development; (3) family, school, and other societal influences on development; and (4) applied issues in child rearing, education, and other socialization practices. Students have an opportunity to clarify their own values about having and raising children and about the responsibilities of society in general to children. Organized on an age-stage basis. Developmental principles, prenatal development, infancy, and the toddler period.

186. Developmental Psychology II

Continuation of Psychology 185. Special attention to intelligence, schools, sex roles, achievement, and prejudice. *Prerequisite: Psychology 80 or 185.*

187. Developmental Psychology III

Continuation of Psychology 186. Puberty through early adulthood. Intellectual development, identity, sexuality, moral development, values classification, and the capacity of humans to change. *Prerequisite: Psychology 80, 185, or 186.*

188. Adult Development Seminar

Limited enrollment. Young adulthood through middle age. Stages and transitions in adult life, the concept of life crisis, and the interplay of situations and personality. Commitment and choice. Part of gerontology emphasis. Available only occasionally.

189. Developmental Psychology Seminar

Small-enrollment discussion class for psychology majors. Readings from the original theoretical and empirical journal literature on some topic area from developmental psychology. Topics vary from year to year. All students prepare research proposals as term projects. Available only occasionally. *Prerequisites: Psychology 185, 186, or 187 and permission of the instructor.*

196. Psychology of Aging

Changes in individual lives that come with aging. Consideration of changes within the person and those occurring in the life situation. Special attention to mental health institutionalization and stresses facing the aged.

197. Advanced Seminar

Intensive focus on selected specialized topics, which vary from year to year. *Prerequisite: permission of instructor.* NCX†

198. Internship/Practicum

Clinical experience in community agencies. Selected readings. Open to upper-division students with an average 3.0 GPA or higher, who have received permission of a faculty sponsor.

199. Directed Reading/Directed Research

Independent projects undertaken by upper-division students with a faculty sponsor. To receive course credit for such research, the student must submit a formal written proposal and have it approved by the sponsoring faculty member and the department chair. The proposal must be submitted before the end of the previous quarter and must meet University requirements for independent study credit (available from the department chair).

† Exempted from challenge

DEPARTMENT OF RELIGIOUS STUDIES

Professor: Joseph A. Grassi
Associate Professors: Catherine M. Bell, Martin L. Cook, Anne Marie Mongoven, O.P., Frederick J. Parrella, John David Pleins, Stephen A. Privett, S.J., James W. Reites, S.J. *(Chair),* Philip Boo Riley, Francis R. Smith, S.J., William C. Spohn, S.J.
Assistant Professors: Paul G. Crowley, S.J., Dwight N. Hopkins, Diane E. Jonte-Pace, Michael E. Moynahan, S.J., Marie-Eloise Rosenblatt, RSM, Robert W. Scholla, S.J., James E. Sweeters
Lecturers: Rita Claire Dorner, O.P., Salvatore A. Tassone, S.J., Tennant C. Wright, S.J.
John Nobili, S.J., Professor: William C. Spohn, S.J.

The Department of Religious Studies offers courses as part of the University Curriculum and a major program for those who wish to concentrate in the study of religion and theology. An academic minor is also available.

The department's program provides students the opportunity to engage in multiple approaches to religion and the world's religious traditions. The aim of the program is to foster an engaging, critical, and integrated understanding of religion in the University's tradition of Jesuit liberal education.

Because of the University's commitment to examine diverse religious traditions, the Department of Religious Studies offers a wide range of courses; and because of the University's commitment to the Catholic tradition, the department offers a special opportunity for students to pursue and examine Catholicism in an academic context.

REQUIREMENTS FOR MAJOR AND MINOR

Lower Division In consultation with their academic adviser, students select four lower-division courses from among each of three areas: (1) Scripture and Tradition (S&T); (2) Theology, Ethics, and Spirituality (TE&S); and (3) Religion and Society (R&S).

Upper Division In consultation with their academic adviser, students select eight upper-division courses in religious studies. Of these eight courses, four must be specifically designated Religious Studies Seminars (RSS). Two seminars are offered each quarter for majors and minors. Majors should take one RSS in each of the three areas (S&T, TE&S, R&S), and the fourth can be in any area. Students interested in a double major should consult their religious studies adviser.

Senior Research Paper All religious studies majors are required to submit a research paper during their senior year, preferably fall or winter quarter. The paper may be completed in course 199 (Directed Reading/Directed Research) or in an RSS course.

Recommended Electives in Biblical Studies

Biblical Languages Koine Greek, Biblical Hebrew, and Biblical Aramaic are available through the Classics Department. These languages are recommended for students who intend to pursue graduate studies in scripture.

Minor in Religious Studies

The minor in religious studies requires completion of one introductory-level religious studies course (1–49); two intermediate-level courses (50–99); and four upper-division courses, one of which must be a Religious Studies Seminar (RSS). Of these seven courses, at least one must be in each of the following areas: (1) Scripture and Tradition; (2) Theology, Ethics, and Spirituality; and (3) Religion and Society.

GRADUATE PROGRAM

The Religious Studies Department also offers a Pastoral Ministries program leading to a master's degree in four areas: catechetics, pastoral liturgy, spirituality, and liturgical music. For more information about the program and a copy of its brochure, contact Rita Claire Dorner, O.P., director of the Graduate Program in Pastoral Ministries.

INTRODUCTORY-LEVEL COURSES

Note: Courses are organized under three areas: Scripture and Tradition (S&T); Theology, Ethics, and Spirituality (TE&S); and Religion and Society (R&S).

1. Introduction to Religious Studies

Study of the ways in which men and women have been religious. Reflections on the contemporary ways of studying religions, especially in light of religious pluralism and secularism. (Some sections, R&S; some, S&T)

2. The Old Testament and Its World

Survey of the historical and religious traditions of ancient Israel. Attention given to the archaeology of Syro-Palestine. Emphasis on the role of the Old Testament in Judaism, Christianity, and Islam. (S&T)

3. Introduction to the New Testament

Formation of the New Testament literature in the first generations of the Christian community. Interpretation of the literary forms used by the community. Examination of the form and principal content of primitive belief and worship. (S&T)

4. Introduction to Christian Tradition

Survey of the history and development of the Christian tradition from the New Testament to contemporary American Christianity. (R&S)

5. Introduction to Catholic Theology

Introduction to the themes and methods of Catholic theology. Emphasis on scripture and tradition in light of contemporary issues. (TE&S)

INTERMEDIATE-LEVEL COURSES

Note: Courses are organized under three areas: Scripture and Tradition (S&T); Theology, Ethics, and Spirituality (TE&S); and Religion and Society (R&S).

50. Religion, Ritual, and Politics

See Anthropology 51.

51. Ancient Greek and Roman Religion

Pagan religious culture in the Classical Mediterranean world. Consideration of the differing religious attitudes and expectations of polytheisms and monotheisms and of religious expression in the context of cult and ritual. (Also listed as Classics 66 and History 16.) (R&S)

52. Faith and Politics in the Middle East

The relationship between religion and politics in the Middle East, both in the historic religious traditions and in the modern world. Focuses on the major religious traditions of Islam, Christianity, and Judaism. Topics include nationalism, revolution, the papacy in the Middle East, and religious tolerance. (R&S)

53. Christianity and World Religions

Religious pluralism as understood primarily in Judeo-Christian tradition. Topics include revelation, authority, truth, and intrareligious dialogue. Analysis of religious truth claims. (TE&S)

55. Theology and Ethics of Thomas Aquinas

An introduction to the life, thought, and ethics of Aquinas. Basic topics to be discussed include the existence of God, human nature, and human participation in society. (TE&S)

56. Anthropology of Religion

See Anthropology 56.

57. Faith, Justice, and Poverty

Foundations for a Christian response to poverty. Liberation theology, social justice, and the relation of economics to religion. (TE&S)

59. Bible in the Jewish Tradition

Historical-critical school of interpretation of the Bible and traditional rabbinical interpretation. Origins and history of the Jews as revealed in their sacred writings. (S&T)

60. Christian Ethics

Dynamics of Christian conduct and of the moral implications of the Christian commitment. Formulation of the principles of a Christian ethic, their application to selected areas of moral conduct in contemporary life, e.g., to wealth and poverty, violence and nonviolence, war and peace, and interpersonal relations. (TE&S)

63. Biblical Drama

Creative drama techniques including mime, role playing, improvisation, psychodrama, and story dramatization are used as tools for exploring and unlocking the riches of biblical stories. (S&T)

64. Christ in the Four Gospels

Formation of the gospels and the individual portrait and interpretation of Jesus by each of the evangelists. Historical ministry of Jesus. Comparison of the Christologies in each of the four Gospels. (S&T)

65. Christ in the Christian Tradition

Explores the issues of the humanity and divinity of Jesus via selective theological interpretations of Jesus Christ from biblical literature, the history of Christian doctrine, and modern theological scholarship. (TE&S)

66. The Pauline Letters

Letters attributed to Pauline authorship. Analysis of the Pauline theology. (S&T)

67. The Synoptic Gospels

History of the formation and literary forms of the Synoptic Gospels. Analysis of salvation history as contained in these sources and in the historical ministry of Jesus. (S&T)

69. Contemporary Catholic Theology

A reading of recent Catholic theologians in light of issues raised by the Second Vatican Council, with a view toward their foundations in classical theology. Topics include tradition, inculturation, doctrinal development, and the emergence of liberation theology. (TE&S)

70. Christian Mysticism

A study of the lives and writings of key figures in the mystical traditions of Christianity. (TE&S)

71. The Theology of C. S. Lewis

Religious writings of C. S. Lewis. Lewis' approach to religious truth and his major theological themes. (TE&S)

72. Women in the Biblical Traditions‡

Attitudes toward women and roles of women in Christianity and Judaism. Old and New Testament perspectives on women in religion, family, and social structure. The contemporary feminist challenge to Judaism and Christianity. Views of the Christian church regarding sexuality and women's ordination. (R&S)

73. New American Religions

Contemporary American religious movements; a critical review of their beliefs and practices, including Divine Light Mission, Hare Krishna Movement, witchcraft, satanism, and a number of other groups. (R&S)

75. Meditation

Study and practice of meditation across religious traditions. Includes daily meditation. (TE&S)

76. Hinduism

Exploration of the historical development, theologies, symbols, rituals, scriptures, social institutions, and 20th-century politics of Hinduism, primarily in India. Focuses on the interaction of religion and culture. (R&S)

77. Buddhism

Exploration of the entire Buddhist tradition, including Indian origins, Theravada traditions of Southeast Asia, and Mahayana traditions of Central and East Asia. Emphasis on cultural impact of religion, Buddhist philosophy, assimilation of Buddhist practice, and modern forms of tradition. (R&S)

78. Christian Liturgy

Appreciation of the structure and rhythm of liturgical worship and of its function as Christian celebration in such ceremonies as the Mass, Sacraments of Initiation, etc. Emphasis on content and the learning of liturgy by designing liturgical celebrations. (TE&S)

80. Religious Symbolism and Myth

Introduction to the meaning and function of symbol and ritual in human life and in Christian worship. Symbolic ritual actions of the Church (sacraments). Questions such as how symbol and ritual express and shape human life and how sacraments express and shape the identity of Christians as church. (TE&S)

81. Theology of the Sacraments

Analysis of the work of Christ as sacrament of God the Father, of the Church as

‡ Course included in Women's Studies program

the sacrament of Christ; and of baptism, confirmation, reconciliation, healing, the Eucharist, marriage, and Orders as the principal sacramental actions of the Church. Origins in the Scriptures. Traditional theological interpretations. (TE&S)

82. Theology of Nonviolence

Nonviolence not only as an instrument of social change but as a way of life resulting from the Christian commitment. (TE&S)

84. Chinese Religions

The historical development of Chinese religions—Confucianism, Taoism, Buddhism—their philosophies as well as the interface between folk religion, society, and political institutions in traditional and modern China. (R&S)

85. Japanese Religions

The historical development, doctrines, institutions, aesthetics, and literature of the religious traditions in Japan—Shinto, Buddhism, folk and new religions. Special attention to Zen Buddhism and modern Shinto. (R&S)

86. The Old Testament as Literature

Exploration of the variety of Old Testament literature: sagas and legends, royal history, love poetry and hymns, wisdom teaching. Examination of the narrative and poetic technique of biblical writers as well as their values and ideals. Comparison with ancient Near Eastern literature. (S&T)

90. Spirituality in Toni Morrison's Novels[§]

An exploratory and critical investigation of spirituality in the lives and thoughts of black women in the novels of Toni Morrison. Examination of this spirituality and the contribution it makes to the African American community and society at large. (TE&S)

91. Slave Narratives[§]

African American slave narratives during the pre-Civil War period. The religious dimensions of slave families, laughter, folklore, conversions, music, and other cultural/political issues. (R&S)

92. The Protestant Tradition

The origins and development of Protestant thought and Protestant ecclesiastical institutions. Special attention to U.S. Protestant Christianity and its impact on U.S. political and social life. (R&S)

95. Ancient Christianity

A survey of the Christian church from its beginnings to the end of the Middle Ages. Emphasis on authority and discipline in the church, dissent and orthodoxy, patterns of religious life, and the relationship of church and state. (R&S)

96. Medieval Christianity

The Christian tradition after Augustine and before Luther. Topics include the split between Byzantine East and Latin West, reform movements, structures of authority, modes of dissent, relations with the political order, and forms of piety and religious life. Extensive reading in primary sources. (R&S)

97. U.S. Catholicism

Historical examination of the Catholic experience in the United States. Topics include the encounter with U.S. pluralism, the impact of immigration, relations with Rome, church/state relations, the development of new structures of Catholic life, and the direction of U.S. Catholicism after Vatican II. (R&S)

[§] Course included in Ethnic Studies program

ADVANCED-LEVEL COURSES

Note: Courses are organized under three areas: Scripture and Tradition (S&T); Theology, Ethics, and Spirituality (TE&S); and Religion and Society (R&S).

101. Liberation Theology

Latin American, African, Asian, and feminist theologies of liberation. Assessment of the impact of these theologies of liberation on such issues as ecclesiology, method in theology, Christology, biblical interpretation, and spirituality. The implications of liberation theology for North Americans. (TE&S)

102. Feminist Theology‡

Examination of central issues emerging today in feminist theology. Exploration of Biblical sources, women in the Christian tradition, sexuality, ethics, morality, and new directions for women in Christianity. (TE&S)

103. Law and Justice: Jewish, Christian, and Islamic Perspectives

The legal system and social ethics of ancient Israel with special emphasis on the concern for social justice in the prophetic literature of the Hebrew Bible. Exploration of early rabbinic law. Emphasis on social justice themes in Third World liberation theology. Consideration of modern Middle East issues. (R&S)

104. Comparative Fundamentalism

Exploration of the roots of recent fundamentalist movements in different religious traditions: primarily Judaism, Islam, U.S. Protestantism, and Hinduism. Focuses on the similarities and differences among these groups regarding authority accorded the "holy book," traditions of interpretation, the formation of community, and the definition of religion in the face of modern secularism. (R&S)

105. Messiahs and the Millennium

A comparative exploration of apocalyptic movements and models of socioreligious change in U.S. UFO cults, Japanese "new" religions, South Pacific cargo cults, and early Christianity. (R&S)

111. Afterlife as a Theological Concept

Biblical, Jewish, Christian, Eastern, humanistic, and psychic claims about the nature of death and the possibility and nature of an afterlife. Modern philosophical assessments of the cogency of those claims. Relation (or nonrelation) between a belief in an afterlife and meaningful human existence. (TE&S)

112. Great Christian Mysteries

Review of fundamental Catholic beliefs. Analysis of ecclesiology and theological anthropology. (TE&S)

114. Contemporary Spirituality: Men and Women for Others

Examination of the central aspects of Ignatian spirituality, with particular attention to the spiritual exercises of St. Ignatius of Loyola as a method for discernment and Christian decision making. Evaluation of the effectiveness of a 16th-century spirituality finding fresh expression today compared with contemporary spiritualities. (TE&S).

116. History of the Jesuits, 1491–1992

See History 102. (R&S)

117. Science, Technology, and Ethics

Investigation of the religious and ethical significance of the impact of technology

‡ Course included in Women's Studies program

on society. Analysis of ethical issues in scientific and engineering practice. (Also listed as Philosophy 117.) (TE&S)

119. The Papacy as History and Idea

Survey of the origins and development of Roman Catholicism's peculiar institution. Focuses on the papacy's emerging self-consciousness and on reception of its claims and policies, concluding with a modern theological assessment. (R&S)

121. State and Church in the Middle Ages: 1000–1450

See History 122. (R&S)

122. The Person of Christ in the New Testament

Jesus' understanding of himself and his mission and their interpretation by New Testament writers. Different major Christologies of the New Testament showing the unity and diversity of their interpretation of Christ. (S&T)

123. Paradigms in Theology and Science

Exploration of the gulf between theology and science. The notion of the paradigm as a basis of conversation between theology and science. Theoretical applications exploring the famous Galileo disaster, evolution, and cosmological theory. (TE&S)

124. Technology and Its Religious Critics

Investigation of religious dimensions of a variety of criticisms of technology. Analysis of historical and social dimensions of technology. (TE&S)

125. Theology of Marcus Garvey and W. E. B. Dubois§

A review and examination of the life, politics, and theology of Marcus Garvey and W. E. B. DuBois. (TE&S)

126. Black Theology in the United States§

A critical assessment of black theology of liberation as it has developed from the 1960s in the United States, including the demands of black women. The reason for a black theology and how it challenges our religious and theological perspectives. (TE&S)

128. Life and Theology of Martin Luther King Jr. and Malcolm X§

A survey of the lives and theologies of Rev. Martin Luther King Jr. and minister Malcolm X, religious leaders and major representatives of the black North American movement for human rights from the 1950s to the present. (TE&S)

136. The Bible and Social Ethics

Prophetic tradition of the Old and New Testaments. Special emphasis on biblical justice and love and their meaning in today's society. (S&T)

137. Theology in a Global Context

Examination of different sociocultural contexts and compares/contrasts the Christian (liberation) theologies that have emerged from them. Focuses on Central America, Haiti, North America, South Africa, and Palestine. Special attention to the preferential option for the poor, salvation/liberation, conversion, inculturation, faith and justice, the relationship between the church and the world. (TE&S)

138. Medical Ethics

Introduction to the major issues in biomedical ethics. Basic principles of biomedical ethics, genetic interventions and reproductive technologies, life and death, abortion, informed consent, euthanasia, patients' rights, professional responsibilities, and confidentiality. (TE&S)

§ Course included in Ethnic Studies program

139. Politics, Ethics, and Religion

History of the institutional relationship between church and state. Various forms of the cultural interaction between politics and religion. Particular emphasis on Anglo-American modes of separating and relating church and state, religion, and politics. Impact of Protestant and Catholic, liberal and conservative, reactions to the American experience. (TE&S)

140. Ethics and Warfare

Historical and contemporary approaches to the ethical issues that arise in warfare. History of the development of Christian thought on war. Applicability of that thought to modern technological war evaluated. (Also listed as Philosophy 140.) (TE&S)

141. Religious Autobiography

Selected Christian autobiographies from St. Paul to Dag Hammarskjold. (TE&S)

143. Thomas Merton

The life and thought of one of the most engaging, creative, and influential members of the U.S. Catholic Church in the 20th century—the Trappist monk Thomas Merton. A selection of Merton's writings on such subjects as prayer, solitude, peace and nonviolence, and Asian spirituality. (TE&S)

144. Christianity and Politics

Historical investigation into changing patterns of the relationship between Christianity and the political order. Emphasis on the foundational events of the biblical–early Christian era and Christianity's experience of secular modernity in the United States. Readings from documentary sources and contemporary discussions. (TE&S)

146. The Christian Experience of God

Nature of religious experience. Emphasis on how the Christian community expresses or symbolizes its experience of God in creed, doctrine, and liturgy. (TE&S)

149. The Theology of Marriage

Christian marriage understood from the scriptures, recent Catholic writing, and a humane psychology of the human person. Survey of Roman Catholic canon law on marriage. (TE&S)

150. Luke—Acts

The Gospel according to Luke and the Acts of the Apostles as a unified document with special emphasis on its sources, message, and theology. (S&T)

151. The Johannine Writings

Fourth Gospel, the Johannine letters, and the Apocalypse: their vocabulary, imagery, and theological concerns. (S&T)

154. Islam in the Middle East

See Anthropology 154. (R&S)

156. Belief and Unbelief

Challenges and responses to belief in the modern era. Primary texts. Problem of evil, religious projection, and the basis in experience of religious assertions. (TE&S)

157. God in Contemporary Thought

The question of God's existence and nature in the writings of contemporary thinkers. (TE&S)

159. Religion in the Theories of Freud and Jung

Meaning, origins, and function of religion in human life according to Freud and Jung. View of human nature; religious belief and symbol; relationship among religion, culture, and personality. Influence of biographical factors on Freud's and Jung's theories of religion. (R&S)

162. Religion in Culture and Society

See Anthropology 150. (R&S)

167. Theology in the Daily News

Study of current events in the light of religious tradition. No lectures. *Prerequisite: a course in scriptural theology.* (TE&S)

168. Gender and Religion in Asia‡

The participation of women in religion (Hinduism, Islam, Judaism, and East Asia) as shaped by notions of female purity and pollution. The role of such beliefs within religious communities. Marriage, sexual segregation, menstruation, motherhood, monasticism, and shamanism. (R&S)

169. The World of St. Augustine

See History 116. (R&S)

172. Contemporary and Comparative Judaism

Judaism in the 20th century in terms of its principal cultural and social influences, its religious forms, and theological teaching. (This course is partially funded by the Jewish Chautauqua Society.) (R&S)

173. Faith and the Holocaust

History of the Nazi attempt to totally exterminate the Jews, the enormity of this evil, and the problems it might pose for faith. (TE&S)

178. Religion in America

A survey of themes and institutions in American religion, both past and present. The development of American religion from the early 17th century to the post–World War I era. Selected themes in the modern religious landscape. (R&S)

179. Aspects of Jewish History

Jewish history as both the story of a people and an account of a tradition of ideas. Exploration of the development of the Jewish people through a close examination of their history and how it has affected their religion and thought. (R&S)

182. The Psalms

The sacred poetry of ancient Israel. Extensive examination of the literary forms of the Psalms. Exploration of ancient Israel's view of faith and worship, with special emphasis on questions of suffering and social justice. (S&T)

185. Literature and Theology

Significant literature from various ages and cultures: its theological content and relevance for the contemporary student. (TE&S)

186. Pilgrimage in Western Europe

See History 124. (R&S)

188. Religious Studies Seminar

Selected topics in the discipline of religious studies.

191. Karl Rahner

Examination of Rahner's theological method and his sources and aims. Focuses on the fundamental theology of the human person, the Incarnation and Christology, the nature of the church and its role in the world, anonymous Christianity, and the requirements for a spirituality at once mystical and oriented toward the world. (TE&S)

192. Lonergan

Examination of the work of the contemporary philosopher Bernard Lonergan and his attempt to find a new foundation for the traditional branches of philosophy and the natural and social sciences. (Also listed as Philosophy 127.) (TE&S)

198. Practicum in Religious Studies

Teaching or religious work, special reading, and theological reflection under the guidance of the department faculty. Restricted to majors in religious studies.

199. Directed Reading/Directed Research

For religious studies majors only.

‡ Course included in Women's Studies program

DEPARTMENT OF THEATRE AND DANCE

Associate Professors: Jagienka A. Drweski, Frederick P. Tollini, S.J.
Assistant Professors: Jerald R. Enos, CSC *(Chair)*,
Michael E. Moynahan, S.J. (courtesy of Religious Studies Department),
Barbara A. Murray
Senior Lecturer: Albert L. Gibson
Lecturers: Peter J. Novak, S.J., David Popalisky, Scott Robertson
Frank Sinatra Professor and Artist-in-Residence: Henry Mollicone

The Department of Theatre and Dance offers a well-rounded liberal education leading to a Bachelor of Arts degree.* The department also produces several theatre and dance presentations each quarter of the academic year in the Louis B. Mayer and the Fess Parker Studio theatres.

Theatre and Dance are distinct but related areas of emphasis. Students in either emphasis share common courses. Students within the theatre emphasis may focus their study on acting, technical theatre, or drama. Majors must fulfill the University Curriculum and College requirements and the department requirements in their emphasis areas.

The Theatre Program offers coordinated courses in acting, design, technical production, dramatic literature, and theatre history. The Dance Program stresses modern dance and choreography, with basic training in jazz and ballet. In both areas, students have many opportunities for performance and production; majors have the option of a senior recital, directing, or design projects.

Students in the Theatre and Dance Department are encouraged to consider a minor in a related field of study, such as art, communication, English, or psychology.

REQUIREMENTS FOR MAJOR IN THEATRE AND DANCE

Lower Division (26 units)

Theatre Emphasis

Performance and Culture I, II, III (11, 12, 13)
Beginning Acting I (20)
Modern Dance I (46)
Introduction to Production (30)
Costume Construction (31) or Light and Sound (32)

Dance Emphasis

Performance and Culture I (11)
Performance and Culture II or III (12 or 13)
Beginning Acting I (20)
Modern Dance I, II, and III (46, 47, and 48)

*The Bachelor of Arts in Dance has been suspended. No new students will be admitted to the program at this time.

Introduction to Production (30)
Dance Composition (49)
Ballet I (43) or Jazz I (40)

Upper Division (40 units)

Theatre Emphasis

One course in Dramatic Literature (110–114, 119, 186)
or Criticism (185)
One Shakespeare course (116, 117, 118)
Theatre or Dance History Seminar (187)
Five theatre and dance electives

Dance Emphasis

Advanced Modern Dance I, II, and III (146, 147, and 148)
Choreography (143)
Theatre or Dance History Seminar (187)
Three theatre and dance electives

REQUIREMENTS FOR MINOR IN THEATRE AND DANCE

Lower Division (16 units)

Theatre Emphasis

Introduction to Theatre (10)
Beginning Acting I (20) or Basic Acting for Nonmajors (24)
Introduction to Production (30)
One theatre and dance elective

Dance Emphasis

Introduction to Theatre (10)
Modern Dance I, II, and III (46, 47, and 48)
4 units of ballet or jazz
Dance Composition (49)

Upper Division (20 units)

Theatre Emphasis

Four theatre and dance courses

Dance Emphasis

Advanced Modern Dance I and II (146 and 147)
Choreography
One theatre and dance elective

THEATRE PRODUCTION PROGRAM

The theatre season usually includes at least four faculty-directed plays, three dance concerts, and student-directed plays and recitals. Participation in departmental productions is open to all members of the University community: students, faculty, and staff. Guest productions by professional dance and theatre companies regularly form part of the season; and guest artists periodically direct, design, or perform in shows with Santa Clara students.

LOWER-DIVISION COURSES

10. Introduction to Theatre Arts

Creating a show: basic performance and production skills leading to theatrical presentation. Recommended for fulfilling visual and performing arts requirement for nonmajors.

11. Performance and Culture I

Survey of Western Culture through the arts of theatre, dance, and music. Ancient Greece and Rome and the Medieval world. (Also listed as Music 11.)

12. Performance and Culture II

Survey of Western Culture through the arts of theatre, dance, and music. The Renaissance in Italy and England; 17th-century Spain and France; the Enlightenment movement. (Also listed as Music 12.)

13. Performance and Culture III

Survey of Western Culture through the arts of theatre, dance, and music; 19th- and 20th-century Romanticism; modern and contemporary eras. (Also listed as Music 13.)

15. Theatre in Practice and Performance

Study and observation of Bay Area theatre productions, including discussion of issues in contemporary American, Asian, Chicano, African American, and Gay/Lesbian theatre. Course culminates in the performance of scenes chosen and performed by students from the contemporary American theatre scene.

20. Beginning Acting I

First acting course for majors and minors in Theatre and Dance. Improvisation and theatre games. Role playing; sensitizing of physical and mental tools. Analysis of skills and problems of individual students.

21. Beginning Acting II

Continuation of 20. Emphasis on scene and monologue study and script analysis. *Prerequisite: Theatre 20.*

22. Voice and Movement for the Actor

The interrelated development of voice and action in training for performance.

23. Chicano Theatre

Study of performance of the "acto," Hispanic American theatre's basic form of theatrical expression.

24. Basic Acting for Nonmajors

Basic principles of role playing for those with an interest in the acting process. Recommended for fulfillment of visual and performing arts requirement.

25. Drama Workshop

Study and performance of scenes from plays. Application of principles and methods taught in basic acting courses. Recommended for majors and nonmajors. *Prerequisite: Theatre 21 or 24 or permission of instructor.* (2 units)

26. Summer Theatre

Performance or technical work in six-week summer program and run of production for Theatre Santa Clara Summerfest. (1–10 units)

27. Children's Theatre Production

The development and production of traditional and bilingual theatre for children. Focus is on ethnic folk tales and social justice issues.

28A. Theatre of Social Issues I

Examination of current social issues through on-site community service, contact with social-action theatre groups, and interviews. Preparation of dramatic scripts based on the issues studied. *Students are required to continue with 28B.* (2 units)

28B. Theatre of Social Issues II

Dramatization and production of scripts on social issues based on research during previous quarter in 28A. *Prerequisite: Theatre 28A.* (2 units)

29. Rehearsal and Performance

Active participation in the preparation and performance of departmental productions as actors, stage managers, assistant stage managers, or assistants to the director. Major design/technical assignments. *Prerequisite: approval of director of production.* May be repeated for a total of 8 units. (2 units)

30. Introduction to Production

Overview of the organization, concepts, terminology, and skills involved in technical theatre.

31. Basic Costume Construction

Introduction to making costumes: pattern drafting, sewing techniques, fabric studies.

32. Basic Light and Sound Crafts

Principles and practice in related areas of light and sound: instrumentation, electronics, and elementary design theory.

33. Make-up for Stage

Basic principles of make-up for the stage. Youth, old-age, and special problems. Use of all media. (2 units)

39. Production Workshop

Training in development of technical skills for stage production. Directed work in scenery and costume construction, lighting, and sound. May be repeated for a total of 8 units. Not applicable to paid work hours or to laboratory hours connected with stagecraft courses. (2 units)

40. Basic Jazz Dance I

(2 units)

41. Basic Jazz Dance II

(2 units)

42. Basic Jazz Dance III

(2 units)

43. Basic Ballet I

(2 units)

44. Basic Ballet II

(2 units)

45. Basic Ballet III

(2 units)

46. Modern Dance I

(2 units)

47. Modern Dance II

(2 units)

48. Modern Dance III

(2 units)

49. Basic Dance Composition

Traditional approaches to compositional problems of form and design, time and rhythm, energy flow and force in dance as art form. (2 units)

50. Musical Theatre Workshop

Dance forms, music, and singing related to the American musical theatre. (2 units)

51. Intermediate Acting I

Characterization: principles and techniques of role portrayal in realistic drama. *Prerequisite: Theatre 21 or equivalent.*

52. Intermediate Acting II

Role development: detailed study of creative method in developing complete roles in realist and naturalist plays. *Prerequisite: Theatre 51 or equivalent.*

53. Phonetics, Diction, and Dialects

Basic vocal skills for the actor.

60. Dance Improvisation

Performance development based on natural body movement, breathing, rhythm, and audial and spatial composition. (2 units)

63. Biblical Drama

Scriptural material explored through dramatic techniques.

68. Techniques of Musical Auditions

See Music 36.

70. Graphics and Design Principles

Introduction to graphic representation. Drafting, mechanical perspective, freehand drawing, isometrics, white model development, painter's elevation, rendering, portfolio presentation.

71. Scenic and Prop Artisan Techniques

Development of advanced skills in metal, woods, and alternative scenic materials. Welding, wood-turning, construction theory, scenic engineering, special materials, and production management. *Prerequisite: Theatre 30 or equivalent.* Offered in alternate years.

72. Theatre Administration and Stage Management

Analysis of preproduction, audition, rehearsal, and performance duties. Procedures and responsibilities of producer and production personnel.

73. Scene Painting

Techniques of painting for the stage. Psychology of color and practical application of paint as employed in all areas of scenic and costume design. Offered in alternate years.

81. British Comic Drama

Introduction to three centuries of English stage comedy. Forms and interests; literature and spectacle.

UPPER-DIVISION COURSES

110. Classical Tragedy

See Classics 181.

111. Classical Comedy

See Classics 182.

112. Modern Drama

Continental drama from Ibsen to the present in translation. Offered in alternate years. (Also listed as English 112.)

113, 114. English Drama I, II

See English 113 and 114.

116. Shakespeare's Tragedies

See English 116.

117. Shakespeare's Comedies

See English 117.

118. Shakespeare's Histories

See English 118.

119. American Drama

Drama in the United States from 1787 to the present. Emphasis on the modern period. (Also listed as English 119.)

120. Acting Styles I: Classical Tragedy

Lecture, demonstration, and practice in acting ancient Greek tragedy. *Prerequisite: Theatre 52 or equivalent.* Offered in alternate years.

121. Acting Styles II: Comedy

Focus on Commedia dell'Arte, Moliere, Restoration period Comedy of Manners. *Prerequisite: Theatre 52, 120, or equivalent.* Offered in alternate years.

122. Acting Styles III: Shakespeare

Techniques for performance of Shakespearean and Elizabethan drama. *Prerequisite: Theatre 52 or equivalent.* Offered in alternate years.

123. Modern Acting

Ensemble work; skills developed through experimental and absurdist drama. *Prerequisite: Theatre 52, 120, or equivalent.*

124. Acting for Nonmajors II

Continuation of 24. *Prerequisite: Theatre 24.*

125. Drama Workshop

See Theatre 25. (2 units)

126. Summer Theatre

See Theatre 26. (1–10 units)

127. Children's Theatre Production

The development and production of traditional and bilingual theatre for children. Focus is on ethnic folk tales and social justice issues.

129. Rehearsal and Performance

See Theatre 29. (2 units)

130. Technical Design

The design process: adapting scenic elevations to building scenery. Transformation of scene designs to carpenter drawings; standard building methods, stage machinery solutions, and budget-regulated design options. Offered in alternate years.

131. Sound Design

Principles of sound in theatre production. Emphasis on practical applications and equipment use; digital and automation sound theories. Offered in alternate years.

132. Lighting Design

Application of lighting skills to production design. *Prerequisite: Theatre 32 or equivalent.* Offered in alternate years.

133. Scene Design

Application of graphic skills to scenic design. Styles, scene painting technique, set decor. *Prerequisite: Theatre 70 or equivalent.* Offered in alternate years.

134. Costume Design

Principles of costume design for the stage. Fabrics and special materials. Rendering. Offered in alternate years.

135. Graphics Design

Layout, illustration, composition of advertising, media, and poster and program design as applied to the performing arts.

137. Pattern Drafting and Draping

Drafting and draping techniques for a basic bodice, skirt, sleeve, and collars and techniques for developing variations. Emphasis on drafting period garments. *Prerequisite: Theatre 31 or permission of instructor.* Offered in alternate years.

139. Production Workshop

See Theatre 39.

140. Advanced Ballet I

Prerequisite: permission of instructor.

141. Advanced Ballet II

Prerequisite: permission of instructor.

142. Advanced Jazz Dance

Prerequisite: permission of instructor.

143. Choreography

Improvisation, composition. Theory and principles of dance choreography. *Prerequisite: Dance 49 or equivalent.*

146. Advanced Modern Dance I

Prerequisite: permission of instructor.

147. Advanced Modern Dance II

Prerequisite: permission of instructor.

148. Advanced Modern Dance III

Prerequisite: permission of instructor.

150. Social History of Fashion I

Study of the influence of social background on structure, style, and the use of clothing in the Western world from ancient times to the 17th century. Offered in alternate years.

151. Social History of Fashion II

Study of the influence of social background on structure, style, and use of clothing in the Western world from the 18th century to the present. Offered in alternate years.

160. Literature and Performance

Adapting literature (poems, novels, short stories, diaries, etc.) for the stage. Theories of both narrative and dramatic structures. Writing complete scripts for performance and production. (Also listed as English 160.)

171. Play Writing

Critical analysis of dramatic structure for the playwright. Scenarios, character studies, writing of original plays. Offered in alternate years. (Also listed as English 170.)

172. Theory of Stage Directing

Basic course in the problems, techniques, and theory of directing plays for the live theatre. *Prerequisites: Theatre 11 and 20 or 24.*

173. Stage Directing Practice

Two-quarter project in directing. A short play, fully staged. *Prerequisites: Theatre 172 and previous permission of instructor.*

185. Drama and Criticism

Special topics in dramatic theory and criticism. Can be repeated for credit as topic varies.

186. Authors and Issues in Drama

Special topics in dramatic literature. Can be repeated for credit as topic varies. (Also listed as English 186.)

187. Theatre or Dance History Seminar

Special topics in the history of theatre and dance performance. Can be repeated for credit as topic varies.

191. Seminar in Arts Administration

Multidisciplinary studies (art, music, theatre) in problems of arts administration. (Also listed as Art 191 and Music 191.)

198. Practicum

Reserved for projects with recognized institutions outside the University. Written proposal must be approved by instructor and department chair one week prior to registration.

199. Recital/Creative Projects/ Directed Reading/Directed Research

Three areas of directed study: recital, reserved for seniors in acting and dance with prerequisite courses; creative projects in directing, choreography, technical production, design, play writing, administration; directed reading and/or research. Written proposal must be approved by the instructor and department chair one week prior to registration.

6

Leavey School of Business and Administration

The Leavey School of Business and Administration offers a professional education emphasizing humanistic and moral development as well as technical proficiency. Graduates of the Leavey School are expected to have a solid understanding of the ethical and global issues confronting business; knowledge of the political, social, and economic environment; and an awareness of the impact of a demographically diverse workforce on organizations.

The Leavey School of Business and Administration confers the degrees of Bachelor of Science in Commerce in Accounting, Decision and Information Sciences, Economics, Finance, Marketing, and Organizational Analysis and Management. A minor in general business is also available.

REQUIRED BACKGROUND

In addition to the recommended high school courses for students applying for admission to the University as freshmen, applicants to the Leavey School must be computer proficient, including knowledge of word-processing and spreadsheet software (e.g., Lotus, Quattro-Pro, Excel). This level of computer proficiency must be achieved prior to the sophomore year and can be obtained by taking noncredit or remedial courses at Santa Clara University or community colleges and/or by using spreadsheet tutorials.

All students are required to subscribe to the *Wall Street Journal* at the beginning of their sophomore year. This requirement will gradually expand the student's knowledge of the current business environment and will also help improve communication skills.

REQUIREMENTS FOR DEGREE: BACHELOR OF SCIENCE IN COMMERCE

The program of study for the degree of Bachelor of Science in Commerce consists of 175 quarter units and includes courses that fulfill the goals of the University Curriculum, Leavey School of Business and Administration curriculum, and respective departmental major curriculums.

For the Bachelor of Science degree, students must fulfill the following University and Leavey School requirements:

Composition and Literature

Four courses: (a) two courses in composition and rhetoric, normally English 1 and 2; (b) one course in writing or in literature that includes a writing component, usually completed during the sophomore year; and (c) English 179B (Business Writing) taken during the junior year. The latter must be completed with a grade of C (2.00 GPA) or higher.

Western Culture

Two courses in one of the following sequences: (a) English 11, 12, and 13; (b) History 11, 12, and 13; (c) Philosophy 11, 12, and 13; (d) Art History 11, 12, and 13; or (e) the 11, 12, and 13 sequence jointly offered by the Music and Theatre and Dance departments. The two Western Culture courses should normally include the modern segment—i.e., course 13.

Foreign Language

Successful completion of the second course of the first-year sequence in a single classical or modern language. Students who have successfully completed the third year of study in a single classical or modern foreign language during high school or who demonstrate an equivalent level of proficiency by passing a language-proficiency examination are exempt from the requirement.

Social Sciences

Three courses: Economics 1 (Principles of Macroeconomics I); Economics 2 and 14 (Principles of Microeconomics I and II). Normally, the three courses will be taken in sequence during the first two years. Economics 14, however, may be taken during the junior year.

Mathematics and Natural Sciences

Two courses: Mathematics 30 and 31 (Calculus for Business I and II) or Mathematics 11 and 12 (Calculus and Analytic Geometry I and II)

Ethics

One course: Philosophy 6 (Ethical Issues in Business)

Religious Studies

Three religious studies courses: (a) two courses normally taken during the freshman and sophomore years—one introductory level and one intermediate level; and (b) one advanced-level course taken after completing 88 quarter units

Accounting

Three courses: Accounting 1 (Introduction to Accounting); Accounting 2 (Financial Accounting); and Accounting 3 (Managerial Accounting)

Data Analysis

Two courses: Business Administration 40 and 41 (Statistics and Data Analysis I and II). Normally, these classes should be taken in sequence and during the sophomore year. Business Administration 41, however, may be completed during the junior year. A working knowledge of a spreadsheet program is a prerequisite for these courses.

Information Systems

One course selected from the following: Computer Engineering 4, 22; Mathematics 10, 164; Decision and Information Sciences 30, 34, 110; Accounting 134. The student's preparation and interests will determine the actual course selected. Students with limited computing experience should enroll in Decision and Information Sciences 34 or Accounting 134. More advanced students may choose one of the other courses listed.

Environment of Business

One course selected from the following: Economics 126 (Economics and the Law); History 177 (American Capitalism); Management 169 (Business and Public Policy); Sociology 149 (Business, Technology, and Society); Economics 136 (20th-Century Economic History)

International Business

One course: Business Administration 80 (Introduction to International Business), normally completed during the sophomore year

Students must complete the balance of the 175 quarter units required for graduation during their junior and senior years. In addition to an advanced-level religious studies course, these courses must contain a minimum of 12 upper-division courses (60 units) and include the following:

1. Five courses that provide a common core of knowledge
   a. Either Management 160 (Organization and Management) or Management 161 (Organizational Structure and Design)
   b. Marketing 181 (Principles of Marketing)
   c. Finance 121 (Financial Management)
   d. Decision and Information Sciences 108 (Production Management)
   e. Business Administration 162 (Capstone Course), taken during the senior year. (The Capstone Course must be completed with a grade of C [2.00 GPA] or higher.)
2. A minimum of five courses in one department

Students must also fulfill the course requirements for a major. Consult individual department sections for course requirements in the Departments of Accounting, Decision and Information Sciences, Economics, Finance, Marketing, and Organizational Analysis and Management.

At least 50 percent of the required 175 quarter units for the degree must be in nonbusiness courses (88 quarter units). Depending on the requirements for a departmental major, students will have a number of elective courses.*

The University also offers two programs of special interest to students: the International Business Program, open to students in the Leavey School of Business and Administration and the College of Arts and Sciences; and the Retail Studies Program, open to all students. See the Other Programs section for further information.

REQUIRED BUSINESS ADMINISTRATION COURSES

40, 41. Statistics and Data Analysis I and II

Two-course introduction to statistical theory and data analysis for business and economics. Topics include using personal computers to explore and summarize information; using probability and estimation to overcome the limits of intuition; forming and evaluating testable hypotheses; using regression analysis to measure and test statistical relationships; and learning to evaluate empirical claims made in business, the media, and research. Emphasis on active learning and the analysis of real-world data using popular statistical software. The value and the limits of statistical techniques. *Prerequisites: Math 12 or 31 and working knowledge of a spreadsheet program.*

80. Introduction to International Business

The basic conceptual vocabulary and theories of international trade and of foreign direct investment. Serves as a prerequisite to advanced courses in international business offered by several business disciplines.

162. Capstone Course

The integration of knowledge from functional business courses with issues of business ethics and demographic diversity in the workplace, all in a global perspective. May be taught in a national policy framework, a corporate strategy framework, or as a quarter-long computer simulation game. Each framework includes a statistical data analysis component and a communication component. *Prerequisite: senior standing.*

*After University and Leavey School requirements have been met, the minimum number of nonbusiness elective units needed is 28 quarter units—i.e., six or seven courses.

DEPARTMENT OF ACCOUNTING

Professor Emeritus: Thomas Maier
Professors: Paul L. Locatelli, S.J., Charles F. Louie
Associate Professors: Jane A. Ou, Shahrokh M. Saudagaran, James F. Sepe *(Chair)*, Neal L. Ushman
Assistant Professors: Vidya N. Awasthi, Suzanne M. Luttman, Lynn M. Pringle
Robert and Barbara McCullough Professors: Shahrokh M. Saudagaran, James F. Sepe

The Department of Accounting provides students with the conceptual and business foundation for careers in public accounting and in business, government, and not-for-profit organizations.

REQUIREMENTS FOR MAJOR

Upper Division

Eight upper-division courses: Accounting 130, 131, 132, 133, 136, 137, 138, and 134

LOWER-DIVISION COURSES

1. Introduction to Accounting

The role of accounting information in economic decision making. Review of alternative financial accounting models. Managerial accounting issues related to budgeting and performance evaluation. The environment of accounting standard-setting in the United States and abroad. The audit function in financial reporting. Corporate annual reports. Significant current developments in accounting. *Prerequisite: sophomore standing.* (Open to nonbusiness students in winter and spring quarters only.)

2. Financial Accounting

Introduction to principles and procedures underlying external financial reporting. Description of double-entry system and the accounting cycle. Analyses of accounting for assets, liabilities, owners' equity, revenues, and expenses. Preparation and interpretation of financial statements. *Prerequisite: ACTG 1.*

3. Managerial Accounting

Introduction to accounting for management planning, control, and decision making. Cost-profit-volume relationships; cost and revenue information for routine and nonroutine decisions; budgeting and profit planning. Discussions of standard costing, responsibility accounting, and decentralization and transfer pricing in the context of management control of operations. *Prerequisite: ACTG 2.*

UPPER-DIVISION COURSES

130. Intermediate Accounting I

Intensive analysis of generally accepted accounting principles as applied to asset accounting. Standards and alternative procedures for accounting for current assets, investments, plant, and intangibles. *Prerequisite: ACTG 2.*

131. Intermediate Accounting II

Intensive analysis of generally accepted accounting principles as applied to accounting for liabilities, stockholders' equity, and the statement of cash flows. Accounting for income taxes, pension, leases, and the reporting of corporate earnings. *Prerequisite: ACTG 130.*

132. Advanced Accounting I

Partnership accounting from organization and operations to liquidation. Study of accounting for business combinations and consolidated statements of affiliated corporations. Purchase accounting and pooling-of-interests accounting. Intercompany asset transfers and other reciprocal relationships. Ownership changes and segment reporting for diversified companies. *Prerequisite: ACTG 131.*

133. Advanced Accounting II

International accounting, including foreign operations and transactions and international accounting standards; accounting for public sector organizations and other not-for-profit organizations, including topics in governmental accounting and accounting for colleges, universities, and health and welfare organizations. *Prerequisite: ACTG 132.*

134. Accounting and Information Systems

Introduction to accounting information systems in abstract and specific situations—in particular, a study of the influence of computer-based information systems on the functions of the accountant and the accounting profession. Focus on the concepts, applications, and design of accounting information systems that provide management with useful and relevant information. *Prerequisite: ACTG 131.*

136. Advanced Cost Accounting

Detailed study of job-order, process, and standard cost-accounting systems. Budgeting and standard costs and cost-profit-volume analysis in planning and control. Decentralization, transfer pricing and divisional performance measurement, and the use of accounting data in capital budgeting decisions. *Prerequisite: ACTG 3.*

137. Auditing

Examination of the techniques used to obtain and evaluate evidence regarding (1) assertions about the quality of performance of management (operational auditing); and (2) assertions made by management in financial statements of the firm. *Prerequisite: ACTG 131.*

138. Income Taxation

Federal income tax practice and theory applied to the determination of tax liability of the individual. Similarities and differences for partnerships and corporations. *Prerequisite: ACTG 131.*

198. Internship

Opportunity for selected upper-division students to work in local government units or firms. *Prerequisite: upper-division standing and approval of the Undergraduate Committee.*

199. Independent Study

DEPARTMENT OF DECISION AND INFORMATION SCIENCES

Professors: Chaiho Kim, Steven Nahmias, Stephen A. Smith *(Chair)*
Associate Professors: Charles D. Feinstein, Manoochehr Ghiassi, Rhonda Lee Righter, Zbynek L. Vancura
Assistant Professors: Suranjan De, Paul M. Thompson
Acting Assistant Professor: Narendra Agrawal
Joseph S. Alemany Professor: Chaiho Kim
JCPenney Research Professor: Stephen A. Smith

The Department of Decision and Information Sciences offers business students instruction in the use of computers and management science techniques to solve the operational and decision-making problems of today's complex organizations.

The decision and information sciences major (DISC) offers courses in the design, implementation, and evaluation of computerized information and decision support systems. Although most graduates have chosen careers in management of information systems, some have chosen careers in other functional areas of business such as production and operations management, finance, and marketing.

REQUIREMENTS FOR MAJOR

Lower Division

In addition to the University Curriculum and School requirements, the decision and information sciences major must include:

DISC 30 (Structured Programming) *or*
DISC 31 (Business Applications Programming)

Upper Division

Five electives from DISC 102, 103, 105, 106, 107, 110, 111, 112, 113, 117, 137, 170, 198, and 199

LOWER-DIVISION COURSES

17. Introduction to Computers

Basic concepts of computers. Coverage of hardware and software. Use of spreadsheets, database files, and elements of BASIC programming. Lab fee required.

30. Structured Programming

How to develop and implement well-structured programs for business applications using C. Foundation for the study of physical database design and operating systems. Students who have received credit for Mathematics 10 may not take this course for credit. Lab fee required.

31. Business Applications Programming

Development of business applications programs using COBOL. Foundation for the study of systems analysis and applications development in the database environment. *Prerequisite: DISC 17 or equivalent.*

34. Management Information Systems

Introduction to management information systems. The technical foundations for understanding information and telecommunications technologies. The use of this knowledge to analyze and design solutions to business problems and case studies and/or projects to illustrate the use of information systems to develop these solutions.

40. Statistics

Theory and applications of probability and statistics for managerial decision-making. Topics include probability theory, random variables, functions of random variables, sampling theory and techniques, statistical estimation and hypothesis testing, and simple and multiple regression analysis. *Prerequisites: Math 11 and 12.*

50. Critical Issues in Manufacturing Competitiveness

Exploration of the decline of the manufacturing sector in the United States. Consideration of specific industries including consumer electronics, automotive and steel, and the onslaught of foreign competition, particularly from Japan and Germany. The implications of the shift from an industrial to a service economy. Readings from several sources and guest speakers from Silicon Valley augment class discussion. Sponsored by the Competitive Manufacturing Institute. (Open to all students.) *Prerequisite: sophomore standing.*

UPPER-DIVISION COURSES

100. Quantitative Methods

Concepts and applications of quantitative models in management. Topics include linear programming, elements of decision theory, transportation, PERT, simulation, and game theory. *Prerequisite: DISC 40 or equivalent.*

102. Seminar in Decision Science

Topics related to current faculty interests. Consideration of relevant new developments in theories and applications in decision science. *Prerequisite: permission of instructor.*

103. Operations Research

Fundamental concepts in operations research for controlling stochastic environments. Brief review of probability concepts. Discussion of Markov processes with application to such areas as brand switching, waiting-line processes, and inventory models. Probable team project assignment. *Prerequisites: Math 11 and 12.*

104. Management Information Systems

Course in management information systems. Data processing technology, data management, functions of MIS, MIS design, and implementation and evaluation of MIS systems. *Prerequisite: DISC 17 or equivalent.*

105. Database Management

A hands-on approach to the design and use of databases for business applications. A three-stage approach to database design: conceptual design using the entity-relationship model, logical design using the relational model, and the physical design of relational databases. Study of query languages, normal forms, and application generation. Use of database software is required. Lab fee required. *Prerequisite: DISC 104 or consent of instructor.*

106. Systems Analysis and Design

Study of a methodology that assists in the development of computer-based information systems for business applications.

Introduction of analysis tools such as dataflow diagrams, decision tables, structured English, and conceptual data modeling. Application of these tools to a systems development project is required. Use of CASE tools encouraged. *Prerequisite: DISC 104 or consent of instructor.*

107. Systems Programming

Discussion of the fundamental concepts of systems programming. Major focus on the overall structure and capabilities of popular operating sytems (UNIX, DOS, VMS, etc.) and how to use operating system facilities to manipulate files, directories, and utility programs. Also covers shell programming concepts for performing system-level programming assignments on dedicated computer systems. Development of several software programs utilizing system programming concepts is required. Lab fee required. *Prerequisite: DISC 30 or knowledge of C or Pascal.*

108. Production Management

Survey of problems and analysis related to the production of goods and services. Topics chosen from the following: demand forecasting, production planning and scheduling, inventory control, material requirement planning, cost and quality control, facility location and layout, and Japanese manufacturing techniques. *Prerequistite: DISC 40 or equivalent.*

110. Computer Simulation Modeling

Examination of computer simulation modeling for the design and operation of complex processes or systems. Theory and techniques of simulation and simulation languages such as SLAM, GPSS, and GASP; inventory control; assembly and job-shop scheduling; and manufacturing process design. Lab fee required. *Prerequisites: DISC 30 and 40 or consent of instructor.*

111. Computer Communications Systems

Introduction to the principles and functions of computer communications in today's information systems. Principles of information transfer over a communication link; principles of networking of a variety of devices dispersed over a small or large geographic area; and functions of interest to users of computer-communication systems, such as electronic mail, file transfer, and electronic data interchange. *Prerequisites: DISC 100 and 104 or consent of instructor.*

112. Artificial Intelligence for Business

The applications of artificial intelligence techniques for designing and implementing expert systems for business and industrial applications. Experience in building simple knowledge-based systems using AI programming languages. Lab fee required. *Prerequisites: DISC 100 and 104.*

113. Decision Support Systems

Study of the design, implementation, and evaluation of interactive computer-based systems that help decision makers utilize data and models to solve semistructured and unstructured problems. *Prerequisites: DISC 100 and 104.*

117. Software Development Project

Integration of system and programming concepts to develop a comprehensive software system. *Prerequisite: DISC 30 or 31.*

137. Advanced Programming

Introduction to object-oriented design methodology. Discussion of different programming paradigms, concepts of data abstraction, inheritance, and encapsulation. Topics include an overview of C++ programming language, data abstraction, overloading, manager functions, inheritance, and virtual functions. Development of several programming assignments using C++ programming language is required. Lab fee required. *Prerequisite: DISC 30 or equivalent.*

170. Physical Database Design

Methodology for design of physical file structures to support single- and multiple-file applications. Data structures, file structures, file access methods, file manipulation, and algorithmic analysis. *Prerequisite: DISC 30.*

198. Internship

Opportunity for selected upper-division students to work in local government units or fims. *Prerequisite: upper-division standing and approval of the Undergraduate Committee.*

199. Independent Study

DEPARTMENT OF ECONOMICS

Professors: Mario L. Belotti, William F. Donnelly, S.J., Alexander J. Field, John M. Heineke, Thaddeus J. Whalen Jr.
Associate Professors: Henry G. Demmert *(Chair)*, Laurence R. Iannaccone, Daniel P. McMillen, Thomas R. Russell, William A. Sundstrom
Assistant Professors: Mah-Lih Chen, Richard T. Coz, S.J., Linda Kamas, Laurence Levin, Helen Popper
W. M. Keck Foundation Professor: Mario L. Belotti
Michel and Mary Orradre Professor: Alexander J. Field

As one of the social sciences, economics studies how society produces, distributes, and consumes its goods and services, focusing particularly on the allocation of scarce resources among different sectors and households. This practical and highly relevant discipline provides insights into such real-world problems as unemployment, inflation, environmental deterioration, and world hunger. The study of economics emphasizes rigorous and systematic analysis and provides an excellent background for graduate study in economics, law, business, or government, as well as employment in the private and public sectors. The majority of economics graduates pursue careers in business, domestic and international banking, government, or private economic consulting.

REQUIREMENTS FOR MAJOR

In addition to fulfilling University Curriculum and School requirements for a Bachelor of Science in Commerce degree, majors in economics in the Leavey Business School must complete the following departmental requirements:

Upper Division: Economics 115, 116, either 162 or 188 (Capstone Course), and four economics electives

Note: Students are strongly encouraged to take Business Administration 40 and 41 in consecutive quarters.

LOWER-DIVISION COURSES

1. Principles of Macroeconomics I

Introduction to the general principles, terminology, and methods of macroeconomics.

2. Principles of Microeconomics I

Introduction to the theory of demand, production, cost, and pricing. *Prerequisite: Math 6, 7, 11, or 30.*

3. Principles of Economics III

Contemporary economic issues and problems. Use of the methodology and tools learned in Economics 1 and 2 to investigate in detail some of the major economic issues of the day. *Prerequisites: ECON 1 and 2 or permission of instructor.*

12. Economic History and Development

History and economic development with special attention to the North Atlantic community. Comparative institutions and economic systems.

14. Principles of Microeconomics II

Continuation of ECON 2. Consumer theory, imperfect competition, welfare economics. Required of majors and students in the Leavey School of Business and Administration. *Prerequisite: Math 11 or 30.*

UPPER-DIVISION COURSES

Prerequisites: Economics 1 and 2, or approval of the Undergraduate Committee, are required for all upper-division courses.

101. Resources, Food, and the Environment

See AGRI 101.

114. Microeconomics I

Introduction to the theory of demand, production, cost, and pricing.

115. Aggregate Economic Theory

Macro, or aggregative, aspects of the economy, emphasizing modern macroeconomic models for explaining the level of output, employment, and prices. *Prerequisite: ECON 173 or BA 41.*

116. History of Economic Thought

Evolution of economic ideas and their influences on the development of economic practices. *Prerequisites: ECON 14 and 115.*

117. European Economic History

Study of the preindustrial environment and industrial growth patterns of Western Europe.

119. American Economic History

Study of growth and institutional change in the U.S. economy since colonial times. Topics include early industrialization, the economics of slavery, and the rise of large business enterprises and labor unions. *Prerequisite: ECON 115.*

120. Economics of the Public Sector

Microeconomic analysis of the role of government in the market economy. Supply of public goods and services, government's role in controlling externalities and regulating private industry, and the economics of the political process. *Prerequisite: ECON 114.*

122. Money and Banking

Theoretical, institutional, and historical approach to the study of money and banking, with particular emphasis on the relationship between the monetary and banking system and the rest of the economy. *Prerequisite: ECON 115 or permission of instructor.* (Students may not take *both* ECON 122 and FNCE 126 for credit.)

124. Industrial Organization

Microanalysis of the structure, conduct, and performance of U.S. industry. *Prerequisite: ECON 14.*

126. Economics and the Law

Application of the tools of economic theory to the analysis of law and legal institutions as they exist in the contemporary United States. *Prerequisite: ECON 14 or permission of instructor.*

127. Public Finance: Taxation

Analysis of various tax policies and their effect on the economy. Individual income taxes, corporate income taxes, consumption taxes, payroll taxes, state and local taxes, and other alternative forms of taxation. *Prerequisites: ECON 14 and 115.*

128. Business Cycles and Forecasting

Study of the nature and causes of economic instability in an industrial economy. *Prerequisite: ECON 115 or permission of instructor.*

129. Economic Development

Analysis of the historical and theoretical context underlying present efforts to increase the rate of economic growth in underdeveloped countries.

130. Latin American Economic Development

Examination of the economic development of Latin American countries, with particular emphasis on the relationships between economic growth and their social, political, and economic structures.

132. Asian Economic Development

Study of the economic development of Asian countries, with particular emphasis on the relationships between economic growth and their social, political, and economic structures.

135. Economic Development of Japan

Analysis of the historical development of modern Japanese economy from the Meiji era to the present with an emphasis on the relationship between government, business, and labor.

136. 20th-Century Economic History

A study of 20th-century economic history.

140. Real Estate and Urban Economics

Examination of the economics of urban problems with emphasis on location and land use, the real estate market, and transportation. *Prerequisite: ECON 14 or permission of instructor.*

143. Real Estate

One quarter in senior year. Entails a research project on a specific program. Includes financing, marketing, development, and construction. (Open only to students admitted to the Real Estate program.)

144. Real Estate Studies Program Internship

One quarter spent as an employee of a real estate firm or lender. Students exposed to construction, appraisal, or financing. (Open only to students admitted to the Real Estate program.)

150. Human Resources Economics

Study of labor productivity, incomes, and employment and how these are affected by labor organizations and labor legislation.

161. The Economics of Race, Ethnicity, and Gender

Empirical and theoretical examination of economic issues relating to race, ethnicity, and gender. *Prerequisites: ECON 14 and 173 or BA 41.*

162. Economic Policy and Perspectives

Application of economic analysis to contemporary policy issues. To be taken during senior year. Satisfies Capstone Course requirement. *Prerequisite: ECON 115.*

163. Ethics and Economic Thought

Use of welfare economics to investigate the issues of distributive justice and market allocation. Topics include utilitarianism, Rawls maximin principle, Nash fairness, and Arrow's impossibility theorem.

170. Mathematical Economics and Optimization

Generalization and reformulation of many familiar micro- and macroeconomic models as mathematical systems. Focus on exploring the properties of these models using mathematical techniques on static models. *Prerequisites: Math 12 or 31 and ECON 14 and 115, or consent of instructor.*

171. Mathematical Economics: General Equilibrium Theory

Study of the mathematical model of market equilibrium. Existence, uniqueness, efficiency, core equivalence, dynamics, and growth. *Prerequisites: Math 12 or 31, ECON 14 and 115, or consent of instructor.*

173. Econometrics

Methods to analyze economic data. Time series data, index numbers, hypothesis testing, and simple regression. *Prerequisites: DISC 17 and 40.*

174. Statistical Analysis

Foundations of statistical research methods, including distribution theory, estimation, testing, and prediction; special emphasis on multivariate models. *Prerequisite: Math 12 or 31 or equivalent.*

177. Advanced Econometrics

Introduction to the techniques used by economists to estimate and test economic relationships. Focus on regression analysis, time series problems, and estimation of multiple equation models. *Prerequisite: ECON 173 or BA 41.*

180. International Economics

Analysis of the theory of international trade, problems in balance-of-payments adjustments, and international economic policies. *Prerequisite: ECON 14.*

182. International Business Economics

The institutions and processes influencing the environment for an enterprise involved in international business. Examination of the concepts, information sources, determinants of exchange rates, and evolution of the multinational corporation. (Open only to nonmajors.)

185. Economics of Technological Change

The economic consequences and causes of technological change. Examination of a succession of technological and organizational breakthroughs and the developments that made these breakthroughs possible.

188. Economics Seminar

Modern economic theories and problems. Satisfies Capstone Course requirement. Admission by invitation only. *Prerequisite: ECON 115.*

198. Internship

Opportunity for selected upper-division students to work in local governmental units or firms. *Prerequisite: upper-division standing and approval of the Undergraduate Committee.*

199. Independent Study

DEPARTMENT OF FINANCE

Professors: Francis J. Corrigan, Charles F. Louie *(Acting Chair)*, Hersh M. Shefrin, Meir Statman
Assistant Professors: Edward H. Chow, Hoje Jo, Atulya Sarin

The finance function, practiced at the personal or organizational level, private and public, is an integral part of the resource allocation process in a well-functioning economy. Through course work that blends theory and practice, the Department of Finance provides students with the background and skills necessary to meet the ever-increasing complexity and demands of today's product and capital markets.

REQUIREMENTS FOR MAJOR

1. Finance 121, 124, 125, 126 (or Economics 122), 130, and 151
2. One elective from Finance 127, 128, 145, 148, 198, 199, or Agribusiness 183

UPPER-DIVISION COURSES

121. Financial Management

Introduction to the basic concepts of working capital and fixed asset management, valuation, and cost of capital. Topics include financial analysis and forecasting, cash management, credit policy, capital budgeting, short- and long-term financing, stock and bond valuation, dividend policy. *Prerequisites: ACTG 1, 2, and 3 and proficiency with spreadsheets.*

124. Investments and Investment Institutions

Introduction to the nature and functions of securities markets and types of financial instruments traded. The formulation of investment goals and policies, trading strategies, and portfolio management. Emphasis on security analysis and valuation. *Prerequisite: FNCE 121.*

125. Corporate Financial Policy

In-depth examination of the interrelationships between corporate investment and financing decisions and their impact on a firm's pattern of cash flows, return, and risk. Special emphasis on the development of analytical techniques and skills for analyzing performance reflected in financial statements. Case studies are used. *Prerequisite: FNCE 121.*

126. Money and Capital Markets

Role and function of financial institutions, financial flows, interest rate structures, money, and capital markets. Emphasis on the implications for the formulation of business financial policy. (Students may not take *both* Finance 126 and Economics 122 for credit.) *Prerequisite: FNCE 121.*

127. Personal Finance

Survey of various areas in personal financial planning. Personal credit and its uses; home ownership (tax effects and other advantages); basic investment media; estate planning.

128. Real Estate Finance

Analytical concepts associated with the financing of real estate. Market, location, and risk analysis; modern appraisal methods; and impact of economic and environmental trends on real estate values. *Prerequisite: FNCE 121.*

130. Ethics and Finance

Exploration of the ethical dimension of information asymmetries in financial markets. Topics include insider training, moral hazard, agency, adverse selection, and financial market regulations concerning disclosure, price manipulation, suitability, trading interruptions, margin requirements, and short-sale restrictions. Discussions based on a deontological and a utilitarian perspective. *Prerequisites: FNCE 121 and 124.*

145. Management of Financial Institutions

The general management and policies of financial institutions. Topics include regulation of financial institutions, interest rate risk management, liquidity, credit and capital management, investment, and commercial and mortgage banking. *Prerequisites: FNCE 121 and 126 or consent of instructor.*

148. Principles of Insurance

Survey of the general principles of insurance and their application to the various branches of the field. *Prerequisite: FNCE 121.*

151. International Finance

Examination of the functioning of the international monetary system and the financial problems of business firms operating internationally. Transfer of international payments, foreign exchange rates, balance of payments, international liquidity, investment, financial markets, banking, and financial management. *Prerequisite: FNCE 121.*

183. Commodities and Futures Markets

See AGRI 183.

198. Internship

Opportunity for selected upper-division students to work in local governmental units or firms. *Prerequisite: upper-division standing and approval of the Undergraduate Committee.*

199. Independent Study

DEPARTMENT OF MARKETING

Professors: Dale D. Achabal, Albert V. Bruno, Shelby H. McIntyre, Tyzoon T. Tyebjee *(Chair)*
Associate Professors: Karen F. A. Fox, Edward F. McQuarrie, J. Michael Munson
Assistant Professor: Peter Crosbie
Glenn Klimek Professor: Albert V. Bruno
JCPenney Research Professor: Shelby H. McIntyre
L. J. Skaggs Professor: Dale D. Achabal

Marketing operates at the cutting edge of a well-managed organization. Development of decision-making and managerial skills are the major objectives of the Department of Marketing program, with special emphasis in innovation, high technology, retailing, and consumer products.

REQUIREMENTS FOR MAJOR

1. Marketing 181, 183, and 189
2. Three courses from Marketing 165, 166,* 178, 179, 182, 184, 185, 187, 188, 198,* and 199

Note: Marketing 183 and 189 should be taken concurrently in the same quarter and, preferably, prior to other marketing electives.

UPPER-DIVISION COURSES

165. Retail Management

Study of trends in retailing and the special managerial problems of retailers. Critical analysis of the retailing process, the environment within which it operates, and its managerial functions. In-depth examination of financial and merchandise strategies. *Prerequisite: MKTG 181.*

166. Retail Studies Program Internship

One quarter (usually summer quarter before the senior year) spent as a full-time employee of a major retailer. During the internship, students are exposed to at least two of the following areas: merchandising, personnel, store management, operations, finance, and advertising/promotion. (Open only to students admitted to the Retail Studies Program.) *Prerequisites: MKTG 165 and 181.*

168, 169. Retail Studies Seminars

In-depth examination of a number of topics useful to future executives in a retailing environment. Store design and layout, merchandise information systems, personnel and sales force management, negotiation, sales promotion and advertising, communications, merchandising, and retail strategy. *Prerequisites: MKTG 181, 165, 166, and consent of instructor.*

178. International Marketing

Examination of problems and opportunities in international marketing. Economic, cultural, political, and legal factors influencing trade and marketing. Fundamentals of international trade and the application of marketing tools: marketing research, product/services strategies, advertising, promotion, sales, pricing, and distribution. Case analyses, guest speakers, exams, and a substantial course project. *Prerequisite: MKTG 181.*

179. Small Business Entrepreneurship

Evaluation of venture ideas and the conversion of these ideas into viable ventures. Discussions of cases, lectures, and presentations by guests with experience relating to the starting of new enterprises (e.g., bankers, attorneys, entrepreneurs). Students develop their own five-year business plan for a new enterprise. *Prerequisite: some knowledge of accounting and finance.*

181. Principles of Marketing

Exploration of the role of marketing in society. Discussion of marketing institutions and analysis of the critical position of marketing in business strategy. Analysis, planning, and control of the marketing function. Use of cases and field projects to apply basic principles.

182. Special Topics in Marketing

Occasional current and interdisciplinary courses offered on a one-time basis or cross-listed with offerings in other departments. May be taken only once in a program of study, even though different ver-

*Counts as an elective *only* if taken for 5 quarter units.

sions are offered under the same title. Consult quarterly schedule of classes for description. *Prerequisites: MKTG 181 and current standing as a marketing major.*

183. Buyer Behavior

How consumers process information and make buying decisions. Investigation of influence factors (such as personality, culture, social class, motivation, perception, family, reference groups) on consumer decision making. Study and comparison of decision processes of industrial buyers to nonindustrial buyers. Particular emphasis on understanding the decision-making process (both consumer and industrial) and its application to the development of sound marketing strategy. Must be taken concurrently with MKTG 189. *Prerequisite: MKTG 181 or consent of instructor.*

184. Advertising and Promotion

The role of advertising in marketing. The communication process, definition of advertising objectives, strategy formulation, budgeting, media selection, copy testing, evaluating advertising results, and regulation. Student teams develop and competitively present a comprehensive advertising plan or similar project. *Prerequisite: MKTG 181.*

185. Sales Management

The principles of effective selling and the management of salespersons. Relationship of the sales function within the organization. *Prerequisite: MKTG 181.*

187. Brand/Product Management

Dynamic decision making using a brand management game. Brand teams make inferences about the business environment, decide on what products to offer, what price to charge, how many salespeople to employ, and how much to budget for advertising, in addition to making production and marketing research decisions. Emphasis on the writing and presentation of the brand plan. *Prerequisite: MKTG 181.*

188. Ethics of Advertising and Selling

Application of ethical perspectives to decisions faced by advertisers and sellers. Resolution of specific situations through cases and projects. Heavy emphasis on class discussion and debate.

189. Marketing Research

The application of marketing research methodology to the solution of business problems. Role of marketing research: its design, execution, analysis, and implementation. Field projects and use of computers to analyze data. Must be taken concurrently with MKTG 183. *Prerequisite: MKTG 181.*

197. Public Relations and Corporate Communication

Theories and practice of public relations. Practical project involving advocacy writing, effective planning, and objective evaluation. The function of public relations in organizational settings. Ethics for public relations professionals. (Also listed as Comm 149.) *Prerequisite: MKTG 181.*

198. Internship

Opportunity for upper-division students to work in local firms and complete a supervised academic project in that setting. *Prerequisites: declared marketing major, either MKTG 183 or 189, and approval of faculty coordinator.*

199. Independent Study

DEPARTMENT OF ORGANIZATIONAL ANALYSIS AND MANAGEMENT

Professors: David F. Caldwell, Jacques Delacroix, André L. Delbecq, James L. Koch, Dennis J. Moberg *(Chair)*, Barry Z. Posner, Manuel G. Velasquez
Associate Professors: James L. Hall, Joel K. Leidecker
Assistant Professors: Barbara Levitt, Mark A. Seabright
Senior Lecturer: David R. Palmer
Charles J. Dirksen Professor of Business Ethics: Manuel G. Velasquez

The Department of Organizational Analysis and Management emphasizes both rigorous analysis and managerial application. Courses are offered in organizational behavior and design, personnel administration, industrial relations, and managerial communication. Additional courses in strategic management, business and public policy, and international management provide a management perspective.

Management majors are those who want to develop balanced general management skills or to specialize in human resource management. Students in other majors who aspire to supervisory or managerial positions will find several of the department electives useful.

REQUIREMENTS FOR MAJOR

1. Three required courses: Management 60 *or* 160, 161, and 173
2. Three courses from Management 166, 167, 169, 170, 171, 172, 198, and 199

LOWER-DIVISION COURSES

11. Business and Society

Discussion and clarification of the role of business in modern society and its relationship with the social, political, and economic environments. The external environment of business and forces influencing the scope, functions, and objectives of business institutions. Lectures, class discussions, and case analyses.

18. Legal Environment of Business I

Examination of the law of contracts, agency, sales, commercial paper, secured transactions in personal property, personal property especially as applied to business, and a general investigation of law and court systems.

60. People in Organizations

Human behavior and job performance, motivation theory, interpersonal and group relationships, leadership, conflict and change. Cases, role plays, simulations, and exercises used to demonstrate principles. (Open only to sophomores.) (Business School students who take MGMT 60 must also take MGMT 161, rather than MGMT 160.)

UPPER-DIVISION COURSES

160. Organization and Management

Introduction to organization theory and practice, including management operation, concepts of organization, departmental and interdepartmental relations, and behavior in organizations. (Not open to students who have taken MGMT 60.)

161. Organizational Structure and Design

Theory and practice of organizational design. Issues include departmentation and coordination; the effect of context and technology on structure; and organizational growth, change, and decline. *Prerequisite: MGMT 60 or 160.*

162. Strategic Management

The interrelationship and coordination of required functional courses—including accounting, finance, management, marketing, and production—leading to the formulation and implementation of corporate strategy. Comprehensive case analyses. *Prerequisite: senior standing.*

166. Personnel Administration

Comprehensive review of the role and functions of personnel departments in business organizations, with particular emphasis on selection and placement, training and development, and compensation systems. *Prerequisite: MGMT 60 or 160.*

167. Industrial Relations

Examination of union-management relations. Why do employees join unions? How are organizing campaigns and elections won? What are typical negotiating behaviors and strategies? Lecture/discussion, case analyses, negotiation and arbitration simulations, guest speakers. *Prerequisite: MGMT 60 or 160.*

169. Business and Public Policy

The impact of social issues on business and business responses to adapt to and influence public policies. Includes ideology, corporate social responsibility, government regulations, and business political activity. Lectures/discussions; case analyses. *Prerequisite: MGMT 60 or 160, or consent of instructor.*

170. International Management

Overview of the issues and problems confronting managers in international work, divided into three segments: the global framework for shared production and trade, institutions by which international work is negotiated and regulated, and operational structures and strategies used by firms and controlled by managers and government representatives. Includes cases and provides a special understanding of nation-state benefits and controls, cultural-developmental variables, and human resource supplies and skills. *Prerequisite: MGMT 60 or 160.*

171. Managerial Communication

Interpersonal and small group communication. Negotiating behavior. Oral and written communication. Integrates theory and skill-building through reading, case analysis, and practice. *Prerequisite: MGMT 60 or 160, or consent of instructor.*

172. Special Topics in Management

Offered occasionally to introduce new topics not covered by existing electives. Topics generally reflect the research interests of the faculty teaching the course. *Prerequisite: MGMT 60 or 160.*

173. Applied Organizational Analysis

Primary focus is an analysis of an organizational topic. Each student works closely with a departmental faculty member in selecting and developing a topic for a project paper and presentation to the department. Course provides background information useful in the job search. Class sessions include research methods and presentations. *Prerequisite: MGMT 161.*

198. Internship

Opportunity for selected upper-division students to work in local organizations. *Prerequisite: upper-division standing and approval of the Undergraduate Committee.*

199. Independent Study

INSTITUTE OF AGRIBUSINESS

Professors: Mario L. Belotti *(Director)*, Robert A. Collins
Associate Professor: S. Andrew Starbird
Assistant Professor: Gregory A. Baker
Naumes Family Professor: Robert A. Collins
W. M. Keck Foundation Professor: Mario L. Belotti

The Institute of Agribusiness offers an MBA in Agribusiness and the following undergraduate classes:

100. Introduction to Agribusiness Management

Application of marketing, production, financial, and strategic management concepts to the problems of firms producing, processing, and manufacturing food products. Particular emphasis on issues critical to agribusinesses, including quality control, seasonality, perishability, and food safety.

101. Resources, Food, and the Environment

Exploration of relationship among food production, resource use, and the environment. Topics include biotechnology, the green revolution, resource depletion, environmental degradation, and food safety. (Also listed as ECON 101.)

183. Commodities and Futures Markets

Introduction to the structure, operation, and functions of agricultural commodity markets. Topics include the determinants of agricultural price movement, speculation strategies, hedging strategies, options on agricultural futures, and the fundamental and technical analysis of prices. (Also listed as FNCE 183.) *Prerequisites: ECON 1 and FNCE 121.*

186. Principles of Agricultural Economics

Study of the U.S. agricultural sector with emphasis on California: problems of production, comparative advantage of Western farm products on domestic and international markets, U.S. contributions to the world food supply. *Prerequisites: ECON 1 and 2.*

7

School of Engineering

The School of Engineering provides knowledge of the mathematical and natural sciences to prepare students to develop and use technology for the benefit of humanity.

The School of Engineering confers the degrees of Bachelor of Science in Civil Engineering, Computer Engineering, Electrical Engineering, Engineering, and Mechanical Engineering. Minors in general engineering and computer engineering are also available. The program of study for the degree of Bachelor of Science includes courses that fulfill the goals of the University Curriculum, School of Engineering curriculum, and engineering departmental major curriculum. Junior standing in the School of Engineering requires qualification by meeting certain minimum academic standards.

REQUIREMENTS FOR MAJOR: BACHELOR OF SCIENCE

The program leading to the degree of Bachelor of Science consists of a minimum of 198 quarter units with a grade point average of at least a C (2.0) in all course work at the University and in the student's engineering courses. Students must declare a major as a condition of registering for the junior year.

For the Bachelor of Science degree, students must fulfill the following University requirements:

Composition and Literature

Three courses: normally, English 1 and 2 and 182

Western Culture

Two courses in one of the following sequences: (a) English 11, 12, and 13; or (b) History 11, 12, and 13; or (c) Philosophy 11, 12, and 13; (d) Art History 11, 12, and 13; or (e) the 11, 12, 13 sequence jointly offered by the Music and Theatre and Dance departments. The two courses in Western Culture should normally be taken in successive academic terms.

Foreign Language

Recommended proficiency in one foreign language, which may be achieved in high school.

Social Sciences

Two courses from the following: Anthropology 2, 3, 4; Economics 1, 2; Political Science 1, 2, 25, 40; Psychology 10, 11; Sociology 1, 33. The two courses do not need to be taken from the same academic department.

Mathematics and Natural Sciences

Particular course requirements are in the respective departmental major descriptions.

Ethics

One course in general or applied ethics from approved ethics offerings in the Department of Philosophy

Religious Studies

Three religious studies courses: (a) two courses, normally taken during the freshman and sophomore years—one introductory level and one intermediate level; and (b) one advanced-level course taken after completing 88 quarter units. These courses are to be taken in numerical sequence.

Prerequisites

Prerequisites for engineering courses will be enforced. If there are any questions regarding qualifications for a course, check with the instructor.

Students must fulfill the following requirements for a *Bachelor of Science Degree in Civil Engineering:*

Humanities	**Units**
University requirements	41
ENGR 182 (or English 182)	2
Mathematics and Science	
Math 11, 12, 13, 21, 22 (or AMTH 106), AMTH 108	24
Chemistry 5, 6	10
Physics 4, 5, 6	14
CENG 20	4
Engineering	
COEN 44 (or COEN 4)	4
ELEN 50	5
MECH 10, 121, 122	13
CENG 10, 41, 42, 43, 115, 121, 125, 128, 132, 134, 135, 140, 141, 143, 145, 192, 193	66
Two design electives from CENG 133, 136, 137, 138, 142, 144, 147, 150	8
One technical elective from either CENG 118, 139, 199, or the design electives listed above	3
Electives	4
Total	198

Students must fulfill the following requirements for a *Bachelor of Science Degree in Computer Engineering*:

Humanities	**Units**
University requirements	41
ENGR 182 (or English 182)	2
Mathematics and Science	
Math 11, 12, 13, 21, 22 (or AMTH 106), 122 (or AMTH 108)	24
Chemistry 5, 6	10
Physics 4, 5, 6	14
One of the following: Math 53 (Linear Algebra), Math 166 (Numerical Analysis), AMTH 118 (Numerical Methods)	4
Engineering	
CENG 41	4
MECH 10, 121	8
ELEN 50, 100, 115	15
COEN 4, 5, 22, 70, 72, 79, 121, 124, 172 or 174 or 176, 179, 194, 195, 196	49
Five additional upper-division computer engineering courses forming a coherent emphasis area selected in consultation with academic adviser	20
Recommended emphasis areas include a. 172, 174, 176 (software engineering) b. 122, 127, 133 (digital systems) c. 122, 177, 178 (computer subsystems) d. 171, 172, 175 (programming languages)	
Electives	8
Total	199

Students must fulfill the following requirements for a *Bachelor of Science Degree in Electrical Engineering*:

Humanities	**Units**
University requirements	41
ENGR 182 (or English 182)	2
Mathematics and Science	
Math 11, 12, 13, 21, 22 (or AMTH 106), and one math elective	24
Chemistry 5, 6	10
Physics 4, 5, 6, 7	19
Engineering	
CENG 41, 42	8
COEN 4, 22	8
MECH 10, 121	8
ELEN 50, 100, 104, 105, 110, 115, 121, 151, 194, 195, 196	44
Technical Electives	(min) 22

At least 22 units, of which at least two courses must be from one of the five option areas listed below. The remaining units must be from upper-division engineering, mathematics, or physical sciences. Of the 22 units, at least 12 must be in engineering design. (The number

of design units associated with each of the EE elective courses is shown in parentheses below.)

a. Circuits, systems, and signal processing: 111(1), 112(3), 114(2), 130(2), 131(2), 133(2), 134(2)
b. Communications and microwaves: 109(0), 133(2), 141(2), 144(2), 145(3)
c. Digital systems: 107(2), 122(4), 124(4), 127(4), 128(2), 153(4)
d. Electronics: 112(3), 116(2), 117(2), 152(3), 153(4), 154(3)
e. Power systems: 160(1), 161(2), 162(2), 164(3)

Electives

Any additional courses so the total number of units in the program is at least 198

Total	198

Students must fulfill the following requirements for a *Bachelor of Science Degree in Mechanical Engineering*:

Humanities	**Units**
University requirements	41
ENGR 182 (or English 182)	2
Mathematics and Science	
Math 11, 12, 13, 21; AMTH 106, 118	24
Chemistry 5, 6	10
Physics 4, 5, 6	14
MECH 15	5
Engineering	
CENG 41, 42, 43	13
COEN 44	4
ELEN 50	5
MECH 10, 11, 114, 115, 121, 122, 123, 131, 132, 140 141, 142, 160, 194, 195, 196	68
Technical Electives	
One must be either MECH 133 or 143; the other can be any upper-division engineering course.	8
Electives	8
Total	202

Students must fulfill the following school and major requirements for a *Bachelor of Science Degree in Engineering*:

Humanities	**Units**
University requirements	41
ENGR 182 (or English 182)	2
Mathematics and Science	
Math 11, 12, 13, 21, 22 (or AMTH 106), and one math elective	24
Chemistry 5, 6	10
Physics 4, 5, 6	14
MECH 15	5
Engineering	
CENG 41, 42, 43	13
COEN 4, 5, 22	12

ELEN 50, 100, 121, 160	20
MECH 10, 11, 121, 122, 123	22
One of the following sequences:	
a. COEN 194, 195, and 196	
b. ELEN 194, 195, and 196	
c. CENG 192 and 193	
d. MECH 114 and 115	
Electives	25–27
Total	198

ENGINEERING HONOR CODE

The Engineering Honor Code is a long-standing Santa Clara tradition. Instituted at the request of the engineering students, the code states: *"All students taking courses in the School of Engineering agree, individually and collectively, that they will not give or receive unpermitted aid in examinations or other course work that is to be used by the instructor as the basis of grading."* Students and teachers cooperate and share responsibilities under the code. *Teachers* are responsible for making clear what aid is permissible and for using procedures that minimize temptations to violate the code. *Students* are responsible for behaving honorably, for actively ensuring that others as well as themselves uphold the code, and for being responsive to violations. *Students* dominate the administration of the code, and they take full responsibility for trying cases of alleged violations and for recommending penalties. Alleged violations should be reported to the Engineering Honor Code Committee. More information on the code and its procedures is contained in a leaflet available from the School of Engineering.

ENGINEERING FACILITIES

The School of Engineering's laboratories are contained in three buildings in the Sullivan Engineering Center, originally built in 1960 and refurbished in 1985–86. The facilities are supported by the incremental tuition for engineering students.

General Computing Facilities

The School of Engineering has 50 Hewlett-Packard 9000 workstations grouped into two classrooms of 20 systems each, with the remaining 10 workstations distributed among engineering laboratories. All workstations run Hewlett-Packard's version of the UNIX operating system and have high-resolution color graphics and a variety of software for computer-aided design (CAD) in civil, computer, electrical, and mechanical engineering, as well as a variety of programming languages.

In addition, Santa Clara provides mainframe and personal computing facilities to support educational programs. Free noncredit short courses for both types of computers are offered periodically. Computer labs are typically open from 8 a.m. to midnight Monday through Friday, with hours slightly reduced on weekends.

The principal academic mainframe system is a Digital Equipment Corporation VAX-6610 running under the VMS operating system. The system can be accessed from three public laboratory facilities and through 30 dial-up ports. Software includes nine programming languages (Ada, LISP, Prolog, Pascal, C, FORTRAN, COBOL, BASIC, and assembler), SPSS and SAS statistical packages, two simulation packages (SLAM and SIMSCRIPT), and the RDB relational database system.

PCs are concentrated in two general-purpose laboratories containing approximately 150 IBM machines and various software packages for word processing, spreadsheet and database applications, and programming. Each PC can function as a terminal to the VAX.

Most of the academic computers are connected by Ethernet local area network (LAN), which provides high-speed communications among the various systems. Santa Clara is also a node on the Internet and BITNET wide-area networks, providing students and faculty with electronic mail, file transfer, and remote-access communications to more than 3,000 nodes in the United States, Canada, Europe, Japan, and other countries throughout the world.

Civil Engineering Laboratories

The *Civil Engineering Laboratories* contain equipment and facilities for experimentation in materials and structural component testing, stress analysis, soil mechanics, geology, testing, surveying, environmental quality, and hydraulics.

The *Computational Analysis and Design Laboratory* contains 386-based personal computer systems that are used in course assignments and design projects. A variety of technical software packages are maintained on the systems with full documentation available to students.

The *Concrete Testing Laboratory* contains facilities for mixing, casting, curing, and testing concrete samples.

The *Environmental Laboratory* is equipped with instrumentation needed for basic chemical and biological characterization of water and wastewater samples. Several pilot-scale treatment systems are also available.

The *Geology Laboratory* is equipped with extensive rock and mineral samples as well as topographic, geologic, and soil maps.

The *Hydraulics Laboratory* is shared with the Mechanical Engineering Department. It contains a tilting flume that can be fitted with various open-channel fixtures.

The *Materials and Structural Testing Laboratory* is equipped with three universal testing machines for tension and compression testing of construction materials such as composites, steel, aluminum, and wood. A 400,000-pound-capacity universal machine is used to test larger specimens. Materials may also be tested in torsion, flexure, impact, and fatique for hardness. A variety of digital and analog equipment is available for testing structural materials and components. The laboratory also contains a loading frame. Smaller structural samples can be tested in tension and compression on Instron and Applied Test Systems equipment. An HP Dynamic Signal Analyzer is used for testing dynamic properties of structural systems.

The *Soil Mechanics Laboratory* contains equipment for testing soils in shear, consolidation, and compaction and for other physical and chemical tests. Field testing and sampling equipment is also available. A complete cyclic triaxial testing system has recently been installed.

The *Surveying Laboratory* has a wide variety of equipment, such as self-leveling levels, transits, theodolites, and electronic distance-measuring devices available for instructional purposes.

Computer Engineering Laboratories

The *ASIC Testing Laboratory* (ATL) supports research conducted by graduate students from the Electrical Engineering and Computer Engineering departments. Computer-aided testing packages from industry and the public domain are used in such projects as fault analysis on the device level, functional testability measures, partitioning HDL models for testability, and rapid prototyping using field programmable gate arrays (FPGAs).

The *Computer Systems and Parallel Processing Research Laboratory* supports research in systolic array design, interconnection networks, parallel operating systems, formal design verification, expert system development for architectural design, parallel software development methodology, application-oriented parallel algorithms, and VLSI design.

The *Digital Systems Laboratory* (operated jointly with the Electrical Engineering Department) provides complete facilities for experiments and projects ranging in complexity from a few digital integrated circuits and other electronic components to complete computer systems. It includes a variety of development systems to support microprocessor-based design, VLSI design, and other computer design projects. It also holds facilities to support digital signal processing projects.

The *Distributed Computing Research Laboratory* is designed to support a variety of research activities in distributed computing, including parallel architectures; parallel applications; high-performance, high-speed, local area networks; lightweight protocols; and distributed operating systems.

The *Object Technology Laboratory* (OTL) is a center for research and education in all aspects of object technology, which is a new paradigm in software system design, development, and implementation. Sponsored research projects conducted at OTL address the theoretical development and application of object technology. Advanced seminars and short courses sponsored by OTL provide an opportunity to learn about the latest developments in object technology.

The *Signal and Image Processing Laboratory* (operated jointly with the Electrical Engineering Department) conducts research in theoretical issues in image processing, image analysis, three-dimensional modeling from two-dimensional data, and nonlinear signal processing. Applications include medical image analysis, two- and three-dimensional image reconstruction, and passive navigation for robotic vision.

The *Software Engineering Research Laboratory* is a dedicated facility for the support of various research activities aimed at developing engineering techniques and tools that help produce and validate high-quality software. Specific research

activities include formal specification and verification methods/tools, design framework for concurrent systems; Case architect, logic programming paradigms, and automatic reasoning.

Electrical Engineering Laboratories

The *ASIC Testing Laboratory* (ATL) supports research conducted by graduate students from the Electrical Engineering and Computer Engineering departments. Computer-aided testing packages from industry and the public domain are used in such projects as fault analysis on the device level, functional testability measures, partitioning HDL models for testability, and rapid prototyping using field programmable gate arrays (FPGAs).

The *Digital Systems Laboratory* (operated jointly with the Computer Engineering Department) provides complete facilities for experiments and projects ranging in complexity from a few digital integrated circuits and other electronic components to complete computer systems. It includes a variety of development systems to support microprocessor-based design, VLSI design, and other computer design projects. It also holds facilities to support digital signal processing projects.

The *Intelligent Control Laboratory* includes two IBM robotic arm systems and several servo-experimenters with computer support systems.

The *Microelectronics Laboratory* provides teaching and research facilities for semiconductor devices and integrated circuit design, fabrication, and characterization. Ongoing research topics include silicon heterostructures, thin dielectrics, and high-temperature superconductors on silicon devices.

The *Microwave and Communications Laboratory* provides a full range of modern measurement capability from 0–22 GHz, including a number of automatic network analyzers and modern spectrum analyzers. It also has extensive computer-aided design and simulation capability, based largely on modern commerical software running on workstations. Interconnection of hardware measurements and computer simulation is stressed.

The *Signal and Image Processing Laboratory* (operated jointly with the Computer Engineering Department) is used primarily for graduate research. It has a Sun 3/280, Sun SPARC server 630, and SPARC workstations, one of which has 24-bit color, a stereo display, and image digitization capability. Texas Instruments TMS320 systems are used for real-time signal processing. Research areas include theoretical issues in image processing, image analysis, three-dimensional modeling from two-dimensional data, adaptive signal processing, artificial neural networks, and nonlinear signal processing. Applications include medical image analysis, two- and three-dimensional image reconstruction, passive navigation for robotic vision, and VLSI implementations of adaptive signal processing.

Mechanical Engineering Laboratories

The *Mechanical Engineering Laboratories* contain facilities for instruction and research in the fields of fluid mechanics, thermodynamics, heat and mass transfer, propulsion, combustion, power generation, air conditioning, shock and vibration, instrumentation, control systems, and materials science.

A variety of internal combustion engines installed on dynamometer stands can be used for studies in diesel and spark-ignition engines. The facilities include instrumentation for evaluating engine performance and for measuring exhaust pollutants. Engine studies can be conducted using a variety of fuels.

The fluid dynamics facilities contain equipment to illustrate the principles of fluid flow and to familiarize students with hydraulic machines and their associated instrumentation. Each device may be supplied from a pump or from a constant-level standpipe with a 25-foot head. A subsonic wind tunnel equipped with an axial flow fan with adjustable blades is available to conduct experiments in aerodynamics and turbomachinery.

Included also in the Mechanical Engineering Laboratories is equipment to study electromechanical energy conversion, response and control of mechanical systems, direct and alternating current machines, solar energy concentrators, and air conditioning. The metallurgy laboratory features a modern scanning electron microscope that is used to familiarize students with properties of materials. The machine shop is equipped with microprocessor and numerically controlled equipment for student instruction, construction of experimental devices, and student projects.

COOPERATIVE EDUCATION PROGRAM

Carolyn Tidwell, B.A. *(Coordinator)*

The Cooperative Education program integrates classroom work with practical industrial experience. The program provides alternate or parallel periods of college education with periods of training in industry. The industrial training is related to the field of study in which the student is engaged and often is diversified to afford a wide range of experience. The objective of the program is to provide students the opportunity, through this interaction of study and work experience, to enhance their academic knowledge, to further their personal and work experience, and to learn about working with people.

The program is open to both undergraduate and graduate students. To qualify for the program, students must have completed at least one quarter at the University. Undergraduates must have junior standing and maintain a 2.5 or higher GPA. Graduate students must maintain a 3.0 GPA. Interested students should contact the Cooperative Education Office in the Career Services Office early in their academic program.

Participating students pay tuition for 2 units plus an administrative fee of $250.

DA VINCI (GENERAL ENGINEERING) PROGRAM

Robert J. Parden, Ph.D. *(Coordinator)*

This program is designed to give each student a thorough grounding in the fundamentals of engineering, physical science, mathematics, applied science, humanities, and social science. The program has two objectives: to provide students

with the background needed to select a specific engineering discipline and to prepare students to pursue that discipline. Exceptional students may choose to design an individual program for upper-division study with an appropriate adviser. A specific discipline or individual program must be selected by the end of the sophomore year before registration for the junior year.

SCHOOL OF ENGINEERING

Dean: Terry E. Shoup
Assistant Dean for Undergraduate Programs: Steven C. Chiesa

The following general engineering courses are interdisciplinary in nature and are offered primarily to satisfy certain minor program requirements.

10. Technology and Society

Impact of technology on the evolution and function of modern society. The impact of technologies related to communications, transportation, information management, energy generation, medicine, and public health. Ethical aspects of the application of new technologies. (4 units)

15. Environmental Quality Engineering

Behavior of chemicals in the environment. Environmental protection strategies. Environmental impact assessment. Risk analysis and economic considerations. Discussion of local, regional, and global environmental problems and alternative solutions. For nonengineering majors. *Prerequisite: Math 6 or equivalent.* (4 units)

182. Technical Communications

Organization of engineering proposals and reports. Use of written, graphical, and multimedia materials for effective technical communication. Development of oral presentation skills and strategies. *Prerequisites: English 2 and junior status.* (2 units)

DEPARTMENT OF APPLIED MATHEMATICS

Professor Emeritus: Gerald E. Markle
Associate Professor: George R. Fegan *(Chair)*
Assistant Professor: Francis J. Conlan

With the exceptions of the three courses below, the Applied Mathematics program is designed for graduate study. A complete listing of the offerings may be found in the *School of Engineering Graduate Programs* bulletin.

UPPER-DIVISION COURSES

106. Differential Equations

First-order linear differential equations, systems of linear differential equations, homogeneous systems of linear differential equations with constant coefficients, the Laplace transform, the solution of differential equations by Laplace transform. *Prerequisite: Math 21.* (4 units)

108. Probability and Statistics

Definitions of probability, sets, sample spaces, conditional and total probability, random variables, distributions, functions of random variables, sampling, estimation of parameters, testing hypotheses. *Prerequisite: Math 21.* (4 units)

118. Numerical Methods

Numerical solution of algebraic and transcendental equations, finite differences, numerical differentiation and integration, and solution of ordinary differential equations. Solution of representative problems on the digital computer. *Prerequisites: ability to program in some computer language, COEN 44, Math 21, and AMTH 106.* (4 units)

DEPARTMENT OF CIVIL ENGINEERING

Associate Professors: Steven C. Chiesa, E. John Finnemore, Sukhmander Singh *(Chair)*
Assistant Professors: Salameh A. Nsour, Reynaud L. Serrette, Paul J. Tikalsky
Wilmot J. Nicholson Family Fellow: Reynaud L. Serrette

Civil engineering encompasses water resources engineering, transportation engineering, structural engineering, environmental engineering, geotechnical engineering, construction engineering, and engineering mechanics.

Water resources engineering deals with the utilization and conservation of surface and ground waters, water supply and distribution, wastewater reclamation, flood control, and irrigation.

Transportation engineering is related to the planning, design, and operation of highways, airports, railways, waterways, and specialized facilities such as tunnels, canals, and harbors.

Structural engineering involves planning and design of such structures as bridges, industrial and commercial buildings, and various special-purpose structures.

Environmental engineering deals with theoretical and applied aspects of water supply, pollution control, and solid and hazardous waste management.

Geotechnical engineering concerns the nature and use of earth media as engineering materials in the analysis, design, construction, and maintenance of foundations, retaining walls, subsurface facilities, and other engineering works.

Construction engineering pertains to the planning, scheduling, construction, and financing of civil engineering–related projects.

Engineering mechanics relates to solid body mechanics; namely, statics and dynamics of rigid bodies and mechanics of deformable bodies.

Civil engineering students, by careful choice and scheduling of electives in consultation with an adviser, can develop a specialized program in a desired area of civil engineering, in addition to the courses required of all civil engineering graduates. Seniors may enroll in introductory graduate courses to satisfy technical elective requirements. Additionally, civil engineering students may spend time in a public or private engineering office as an intern or co-op student, learning the functions of civil engineering practice.

LOWER-DIVISION COURSES

10. Surveying

Survey instruments: their use and care. Principles of topographic mapping, linear measurements, leveling, traverses, curves, boundary, and public surveys. Field laboratory. (4 units)

15. Civil Engineering Materials

Origin, manufacture, and processing of materials used in civil engineering. Physical properties of metals, wood, plastics, cement, concrete, and other engineering materials. Corrosion and its prevention. Laboratory. (4 units)

41. Mechanics I: Statics

Resolution and composition of force systems and equilibrium of force systems acting on structures and mechanisms. Distributed forces. Friction. *Prerequisites: Physics 4 and MECH 10.* (4 units)

42. Mechanics II: Dynamics

Dynamics of a particle and dynamics of rigid bodies. Work and energy methods. Momentum methods. Kinetics of systems of particles. Introduction to theory of vibrations. *Prerequisite: CENG 41.* (4 units)

43. Mechanics III: Strength of Materials

Analysis of stresses and strains in machines and structural members. Axial forces, torsion, bending, and combined loads. Stability of columns. Energy theorems and their applications. Laboratory. *Prerequisite: CENG 41.* (5 units)

UPPER-DIVISION COURSES

118. Construction Engineering

Construction management. Equipment. Drawings and specifications, cost estimating, bidding. Contracts, bonds, financing, insurance. Labor. Project planning and scheduling. *Prerequisite: junior standing.* (3 units)

120. Engineering Geology

Development and formation of geologic materials. Significance of structure, land form, erosion, deposition. Stream and shoreline processes. Surface water. Laboratory. (4 units)

121. Geotechnical Engineering

Origin, development, and properties of soils. Classification of soils and applications of engineering mechanics to soils as an engineering material. Water in soils. Soil-testing methods. Compaction, stabilization, consolidation, shear strength, and slope stability. Laboratory. *Prerequisites: CENG 20 and 43.* (4 units)

125. Municipal Engineering Design

Various aspects of civil engineering as applied in municipal (public works) design practice. Maps and plats; site layout and earthworks; drainage; streets and utilities.

Design laboratory. *Prerequisites: CENG 10 and MECH 122.* (4 units)

128. Engineering Economics

Time value of money. Economic analysis of engineering projects. Planning and capital budgeting. Rate-of-return analysis. Depreciation. Cash-flow analysis. (2 units)

132. Structural Analysis

Analysis of statically determinate beams, trusses, and frames. Influence lines for beams. Deflections computed using moment area, virtual work, and other analytical methods. Introduction to statically indeterminate analysis using stiffness and flexibility methods. Introduction of computer applications. *Prerequisite: CENG 43.* (4 units)

133. Timber Design

Design of timber structures. Particular attention to the design of main structural members for tension, compression, and bending. Timber design project is required. *Prerequisite: CENG 132.* May be taken for graduate credit. (4 units)

134. Structural Steel Design

LRFD concepts of structural steel design for buildings and other structures. Types of loading. Design of individual members including tension members, beams, and columns. Introduction to connection design. Steel design project is required. *Prerequisite: CENG 132.* May be taken for graduate credit. (4 units)

135. Reinforced Concrete Design

Analysis and design of reinforced concrete structural elements using the ultimate strength method. Design of elementary structures, e.g., three-story buildings, retaining walls. Design laboratory. *Prerequisite: CENG 132.* (5 units)

136. Advanced Concrete Design

Analysis and design of structural systems such as bridges, buildings, etc., involving reinforced concrete and prestressed concrete. Advanced topics in reinforced concrete design. *Prerequisite: CENG 135.* (4 units)

137. Earthquake Engineering Design

Introduction to the dynamics of single- and multi-degree-of-freedom lumped mass systems. Idealization of real structures and analysis of models by equivalent static method. Introduction to UBC and SEAOC provisions for seismic design. Special considerations for earthquake-resistant design of steel, timber, and reinforced concrete structures. *Prerequisite: CENG 132.* May be taken for graduate credit. (4 units)

138. Geotechnical Engineering Design

Surveying, mapping, and foundation exploration; bearing capacity and settlement analysis; spread foundations; piles and caissons; earth-retaining structures; loads on underground conduits; subsurface construction. *Prerequisites: CENG 121 and 135.* May be taken for graduate credit. (4 units)

139. Hydrology

Precipitation, evaporation, transpiration, runoff, and infiltration. Drainage areas, concentration points, storage, and floods. Underground movement of water and contaminants. Laboratory. *Prerequisite: MECH 122.*(3 units)

140. Water Resources Engineering

Concepts of various aspects of water resources: surface water, groundwater, water supply and distribution, hydraulic structures and irrigation. Interrelationship of all aspects. Importance of water resources to the total needs of the community. Laboratory. *Prerequisite: MECH 122.* (4 units)

141. Hydraulic Engineering

Principles of hydraulics; flow in pipes and pipe networks; water hammer and surge tanks; steady flow in open channels, in-

cluding bends and transitions. *Prerequisite: MECH 122.* (4 units)

142. Water Resources Design

Design of system components for water supply and flood control projects including storage facilities, closed conduits, open channels, well fields, and pumping systems. Computer applications in the design and evaluation of water resources–related facilities. *Prerequisites: CENG 140 and 141.* (4 units)

143. Environmental Engineering

Water and air quality. Water supply and pollution control; air pollution control. Management of solid and hazardous wastes. Environmental impact assessment. Laboratory. *Prerequisites: Chemistry 6 or equivalent and junior standing.* (4 units)

144. Environmental Systems Design

Design of treatment and distribution systems for potable water. Design of collection and treatment systems for water pollution control and wastewater reclamation. Laboratory. *Prerequisites: CENG 141 and 143.* (4 units)

145. Transportation Engineering Design

Transportation systems analysis and design. Traffic flow. Geometric design of systems. Principles of highway design. Planning, construction, and operation of transportation systems. Transportation policies and economics. *Prerequisites: CENG 10 and junior standing.* (4 units)

147. Pavement Design

Paving materials. Geometric and structural design of highways. Urban street layout and details. Layout and design of airport runways. *Prerequisites: CENG 121 and 135.* (4 units)

150. Traffic Engineering: Design and Operations

Basic characteristics of motor-vehicle traffic, highway and intersection capacity, applications of traffic control devices, traffic design of parking facilities, engineering studies, signal design, traffic safety, design of crash barries. *Prerequisite: CENG 145.* May be taken for graduate credit. (4 units)

188. Co-op Education I

Integration of classroom study and practical experience in a planned program designed to give students practical work experience relating to their academic field of study and career objectives. Alternate or parallel periods of classroom study with periods of training in industry and government. Work includes overall report on assignment activities. P/NP grading. May be taken for graduate credit. Additional fees required. (2 units)

189. Co-op Education II

Credit given for a technical report on a specific activity such as a design or a research project, etc., after completing the co-op assignment. Approval of department co-op adviser required. Letter grades based on content and presentation quality of report. May be taken for graduate credit. (2 units)

192. Civil Engineering Design Methods

Introduction to problem-solving methodology for design of civil engineering systems and components. Applications of engineering techniques and procedures to civil engineering design. Preliminary design studies and evaluation of alternatives. Selection of a topic for the Senior Design Project (CENG 193) and initial conceptual design. *Prerequisites: senior standing and English 182.* (2 units)

193. Senior Design Project

Investigation of an approved civil engineering project. The design process—including problem formulation, analysis, preliminary design, final design, and plans—is completed. Students present results at Senior Conference. *Prerequisite: CENG 192.* (4 units)

198. Internship

Time off campus with an engineering organization. Different aspects of work in the assigned professional office. Oral and written reports. *Prerequisites: senior standing and approval of internship coordinator.* (4 or 8 units)

199. Directed Research

Investigation of an approved engineering problem and preparation of a suitable project report. Conferences with faculty adviser are required. *Prerequisite: senior standing.* (2–6 units)

DEPARTMENT OF COMPUTER ENGINEERING

Associate Professors: Hasan S. AlKhatib, Ronald L. Danielson, Ruth E. Davis, Mohammad Ali Ketabchi, Daniel W. Lewis *(Chair)*
Assistant Professors: Qiang Li, Fuyau Lin, Nam Ling

The Computer Engineering degree features a balanced core program in which each student studies the engineering aspects of hardware and software as well as the underlying theory of computation. The Computer Engineering electives permit students to build on this core with varying emphasis, depending on their interests.

The Computer Engineering program is supported by the facilities of the School of Engineering and the University's Academic Computing Center. The principal teaching computer system in the School of Engineering is a network of more than 50 high-end HP workstations and more than 10 other workstations, all in the Engineering Design Center—a well-maintained sophisticated computing system available to undergraduate as well as graduate students. A large number of Sun and HP workstation systems and other equipment are available in other laboratories described below. The principal computing facilities supported by the Academic Computing Center include a DEC VAX/6610 and six personal computer laboratories with more than 200 IBM PCs.

Department Research and Teaching Labs

The *ASIC Testing Lab* (ATL) supports research in such topics as fault analysis on the device level, functional testability measures, partitioning HDL models for testability, and rapid prototyping using field programmable gate arrays (FPGAs).

The *Computer Systems and Parallel Processing Research Lab* supports research in systolic array design, interconnection networks, parallel operating systems, formal design verification, expert system development for architectural design, parallel software development methodology, application-oriented parallel algorithms, and VLSI design.

The *Digital Lab* is a teaching lab for design of digital systems, microprocessors, and digital signal processing. Facilities include HP 64000 development systems and TMS 320C25 and TMS 320C30 development systems.

The *Microelectronics Lab* is a teaching and research lab devoted to device and IC fabrication, device characterization, process and device simulation, parameter extraction, and VLSI design.

The *Signal and Image Processing Lab* is a teaching and research lab equipped with Sun 4 systems with RasterOps digitization and 24-bit color display and a Tektronics stereo display.

The *Software Engineering Lab* is a dedicated facility for the support of various research activities aimed at developing engineering techniques and tools that help produce and validate high-quality software. Specific research activities include formal specification and verification methods/tools, design framework for concurrent systems; Case architect, logic programming paradigms, and automatic reasoning.

The *Storage Technology Lab* supports research in recording head models and measurements, recording channel electronics, recording media measurements, and testing.

LOWER-DIVISION COURSES

4. Introduction to Programming

Structured algorithmic approach to problem solving using Pascal. Programming techniques such as top-down or stepwise refinement. Specification writing and the importance of documentation and self-documenting code. Credit not allowed for both COEN 4 and Math 10 or DISC 30. (4 units)

5. Introduction to Data Structures

Arrays, records, stacks, trees, linked lists, queues. Internal sorting: insertion, exchange, selection. Searching techniques. Program development tools and environments. Programming in the small and in the large. Programming in Pascal required. Credit not allowed for both COEN 5 and Math 61. *Prerequisite: COEN 4.* (4 units)

22. Machine Organization and Programming

Assembly-language programming. Introduction to computer architecture. Number systems and representation; memory organization, computer organization; computer arithmetic; input/output. Impact of computer hardware on software. Introduction to assembler techniques. Programming required. *Prerequisite: COEN 4 or Math 10.* (4 units)

23. Programming in C

Introduction to systems programming using the C programming language. Automated program building and separate compilation. Programming tools such as MAKE and LINT. Principles of modularity, encapsulation, and abstraction. *Prerequisites: COEN 22 and either COEN 4 or Math 10.* (4 units)

44. Applied Programming

Introduction to computer operating systems. Elements of computer programming in FORTRAN, including input/output, branching and loops, structured programming, programming for computational efficiency. Programming of elementary mathematical operations. Applications to engineering problems. *Co-requisites: Math 21 and CENG 41.* (4 units)

70. Advanced Data Structures

Specification, representation, and implementation of data structures using Ada. Data and procedural abstraction. *Prerequisites: COEN 5 and 22.* (4 units)

72. File Organization

Storage structure and management. Basic file organizations: sequential, direct, hashed, indexed, hybrid. External sorting and searching. Continuation of COEN 70. *Prerequisite: COEN 179 or Math 163.* (4 units)

79. Discrete Mathematics

Relations and operations on sets, orderings, elementary combinatorial analysis, recursion, algebraic structures, graphs. (Also listed as Math 51.) (4 units)

UPPER-DIVISION COURSES

121. Logic Design

Basic switching circuit and logic design concepts. Noise margin, propagation delay, Boolean algebra. Minimization techniques, including Karnaugh maps and QM techniques. Combinational circuit design with MUXs, PLAs, and ROMs. Analysis of synchronous sequential circuits, counters, shift registers, etc. Use of CAD tools. (Also listed as ELEN 121.) *Co-requisite: COEN 121L.* (4 units)

121L. Logic Design Lab

Laboratory for COEN 121. Design, development, and construction of digital circuits from word-problem statements. CAD approach to circuit design in lab. (Also listed as ELEN 121L.) *Co-requisite: COEN 121.* (1 unit)

122. Computer Architecture

Overview of computer systems, CPU design, computer arithmetic, microprogramming techniques, design of main memory, memory hierarchies and management, input/output subsystem organization, interrupt handling and DMA channels. Laboratory projects include design and implementation of a CPU based on a bit-slice microprocessor. (Also listed as ELEN 122.) *Prerequisite: COEN 124.* (5 units)

124. Introduction to Microprocessors

Overview of microprocessor organization, hardware-software trade-offs. Survey of microprocessor architectures and assembly languages, LSI memory chips, memory section design, LSI I/O techniques, interrupts, DMA channels, microcomputer development systems. (Also listed as ELEN 124.) *Prerequisites: COEN 22 and 121; co-requisite: COEN 124L.* (4 units)

124L. Microprocessor Lab

Laboratory for COEN 124. (Also listed as ELEN 124L.) *Co-requisite: COEN 124.* (1 unit)

127. Advanced Logic Design

Contemporary design of finite-state machines as system controllers using MSI, PLDs, or FPGA devices. Minimization techniques, performance analysis, and modular system design. Design and analysis of asynchronous systems. (Also listed as ELEN 127.) *Prerequisite: COEN 121; co-requisite: COEN 127L.* (4 units)

127L. Advanced Logic Design Lab

Laboratory for COEN 127. Design, construction, and testing of controllers from verbal specs. Use of CAD design tools. (Also listed as ELEN 127L.) *Co-requisite: COEN 127.* (1 unit)

128. Computer Graphics Systems

Interactive graphic systems. Graphics primitives, line and shape generation. Simple transforming and modeling. Efficiency analysis and modular design. Interactive input techniques. 3D transformations and viewing, hidden surface removal. Color graphics, animation, real-time display considerations. Parametric surface definition and introduction to shaded-surface algorithms. *Prerequisites: Math 53 and COEN 5 or Math 61.* (4 units)

129. Current Topics in Computer Engineering

Subjects of current interest. May be taken more than once if topics differ. (4 units)

133. Digital Signal Processing

Description of discrete signals and systems. Difference equations. Convolution

summation. Z-transform, transfer function, system response, stability. Discrete Fourier transform. Frequency characteristics. Digital filter design. State-space design. Laboratory. (Also listed as ELEN 133.) *Prerequisite: ELEN 110.* May be taken for graduate credit up to 12 units. (5 units)

134. Applications of Digital Signal Processing

Course extends digital signal processing and digital filtering theory to modern applications. Design and analysis of digital filters and processing used in telephone systems digital audio and compact disc recording, and medical imaging. Implementations with special-purpose microprocessors and parallel architectures analyzed for real-time operations. (Also listed as ELEN 134.) *Prerequisites: COEN 133 and ELEN 141.* (4 units).

153. Digital Integrated Circuit Design

Analysis and design of digital MOS and bipolar integrated circuits. Based on first-order nonlinear device models, hand calculations and computer simulations (SPICE) used to design gates and SSIs. Circuit modeling considerations. Circuit performance evaulation with computer-aided circuit analysis. Design of MSIs from flowchart to layout. PLAs and finite state machines using array logic. Introduction to system design. (Also listed as ELEN 153.) *Prerequisites: ELEN 115 and COEN 121.* (5 units)

171. Principles of Design and Implementation of Programming Languages

High-level programming-language concepts and constructs. Costs of use and implementation of the constructs. Issues and trade-offs in the design and implementation of programming languages. Critical look at several modern high-level programming languages. *Prerequisite: COEN 5 or Math 61.* (4 units)

172. Structure and Interpretation of Computer Programs

Techniques used to control complexity in the design of large software systems. Design of procedural and data abstractions; design of interfaces that enable composition of well-understood program pieces; invention of new, problem-specific languages for describing a design. Programs written and run in a dialect of LISP. *Prerequisite: COEN 5 or Math 61.* (5 units)

173. Logic Programming

Application of logic to problem solving and programming; logic as a language for specifications, programs, databases, and queries; separation of logic and control aspects of programs; bottom-up reasoning (forward from assumptions to conclusions) versus top-down reasoning (backward from goals to subgoals) applied problem solving and programming; nondeterminism, concurrency, and invertibility in logic programs. Programs written and run in Prolog. *Prerequisite: COEN 5 or Math 61.* (4 units)

174. Introduction to Software Engineering

Systematic approaches to program design, project management, implementation, documentation, and maintenance. Software design methodologies. Structured programming, top-down implementation schemes, and stepwise refinements. Debugging, monitoring, and maintenance techniques. *Prerequisite: COEN 5 or Math 61.* (5 units)

175. Introduction to Formal Language Theory and Compiler Construction

Introduction to formal language concepts: regular expressions and context-free grammars. Compiler organization and construction. Lexical analysis and implementation of scanners. Top-down and bottom-up parsing and implementation of top-down parsers. An overview of symbol table arrangement, run-time memory allocation, intermediate forms, optimization,

and code generation. *Prerequisite: COEN 5 or Math 61.* (4 units)

176. Software Tools Design

The design techniques for building good software tools. The concepts of filters, pipes, files, program arguments, and other facilities that make basic tools work well together. Learning by examination and modification of existing tools. Programming assignments are required in C language running under a UNIX environment. *Prerequisites: COEN 23 and either COEN 5 or Math 61.* (5 units)

177. Operating Systems

Introduction to organization of operating systems. Management of memory, processors, and other system resources, deadlock problems, and avoidance. Process interaction and communication. Sharing and protection of processes and data. File structures. Implementation considerations. *Prerequisite: COEN 5 or Math 61.* (4 units)

178. Introduction to Database Systems

File organization. Hierarchical, network, and relational data models. Database design techniques based on integrity constraints and normalization. Database languages; protection backup and recovery, concurrency control. *Prerequisites: COEN 72 and either COEN 5 or Math 61.* NCX† (4 units)

179. Theory of Algorithms

Preliminaries: measuring work done by algorithms. Nonnumerical algorithms: searching, sorting, graph spanning and traversal, string matching. Numerical topics: polynomial and matrix arithmetic. P and NP completeness. (Also listed as Math 163.) *Prerequisites: COEN 79 or Math 51 or 52, and COEN 5 or Math 61.* (4 units)

180. Introduction to Information Storage

Storage techniques and mass storage devices. Use of memory in computer systems. Design of semiconductor, magnetic and optical (disk drives), and magnetic tape memories. Storage controllers, computer interfaces, system software interfaces. Emphasis on current mass storage devices and interfaces: SCSI, IPI, ST506, ESDI. (Also listed as ELEN 180.) *Prerequisites: COEN 22 and 121; COEN 122 recommended.* (4 units)

188. Co-op Education I

Integration of classroom study and practical experience in a planned program designed to give students practical work experience relating to their academic field of study and career objectives. Alternate or parallel periods of classroom study with periods of training in industry and government. Work includes overall report on assignment activities. P/NP grading. May be taken twice. May not be taken for graduate credit. Additional fees required. (2 units)

189. Co-op Education II

Credit given for a technical report on a specific activity such as a design or a research project, etc., after completing the co-op assignment. Approval of department co-op adviser required. Letter grades based on content and presentation quality of report. May be taken twice. May not be taken for graduate credit. (2 units)

194. Design Project I

Specification of an engineering project, selected with the mutual agreement of the student and the project adviser. Complete initial design with sufficient detail to estimate the effectiveness of the project. Initial draft of the project report. *Prerequisite: English 182.* (2 units)

† Exempted from challenge

195. Design Project II

Continued design and construction of the project, system, or device. Initial draft of project report. *Prerequisite: COEN 194.* (2 units)

196. Design Project III

Continued design and construction of the project, system, or device. Final report. *Prerequisite: COEN 195.* (2 units)

197. Computer Engineering Field Trips

Field trips to industrial sites and research centers to expose students to exciting, thought-provoking, state-of-the-art work involving the latest computer hardware and software technologies. Enrollment limited to upper-division majors in computer engineering, computer science, or decision and information sciences. P/NP. (1 unit)

199. Independent Study

Open to department scholars only. (1–6 units)

DEPARTMENT OF ELECTRICAL ENGINEERING

Professors Emeriti: Shu-Park Chan, Henry P. Nettesheim
Professors: Timothy J. Healy *(Chair)*, Samiha Mourad, Dragoslav D. Siljak, Sally L. Wood, Cary Y. Yang, Raymond B. Yarbrough
Associate Professors: Jack A. Peterson, M. Mahmudur Rahman
Assistant Professors: Tokunbo Ogunfunmi, H. Chris Tseng
Adjunct Professor: Geoffrey Bate
Adjunct Professor and Director, Institute for Information Storage Technology: Albert S. Hoagland
Senior Lecturer: Donald P. Leach
Thomas J. Bannan Professor: Timothy J. Healy
Clare Boothe Luce Professor: Samiha Mourad
Benjamin and Mae Swig Professor: Dragoslav D. Siljak

Electrical engineering includes the design, construction, and operation of electrical components, circuits, and systems. Electrical engineers are concerned with all phases of the electrical transmission of information such as in radio, television, satellite communications, fiber optics, electric power, and telephone systems. Data processing and data storage equipment and computers used by business, industry, and government are included in their major area of interest.

The Electrical Engineering program is supported by the facilities of the University's Academic Computing Center, as well as seven major teaching and research laboratories and three additional laboratories used only for teaching. The principal computers for the University's academic functions include a Digital Equipment Corporation VAX-6610, and six personal computer laboratories with more than 200 IBM PCs. In addition, the School of Engineering has a large number of workstation systems from Hewlett-Packard, IBM, Sun, and DEC. The major teaching system, one of the most sophisticated and modern undergraduate

teaching facilities in the world, is a network of 50 HP 320 DesignCenter computers.

The three teaching laboratories cover the fields of electric circuits, electronic circuits, and digital circuits. The following research and teaching laboratories are used in the undergraduate program:

***ASIC Testing Lab* (ATL)** Supports research in such topics as fault analysis on the device level, functional testability measures, partitioning HDL models for testability, and rapid prototyping using field programmable gate arrays (FPGAs).

Digital Digital systems. Microprocessors. HP 64000 Microprocessor Development Systems. Digital signal processing. TMS 320C25 and 320C30 development systems.

Microelectronics Device and IC fabrication. Device characterization. Process and device simulation. Parameter extraction. VLSI design.

Microwaves and Communications Spectral and network analysis. HP 8753 Vector Network Analyzers. Touchstone, HP-MDS, and other CAD/CAE software on IBM AT and HP 360. Device design, construction, and measurement.

Intelligent Control IBM 7545 robots, Teachmover Microbots, HP 9000 workstations, servosystems, electromechanical measurement devices.

Signal and Image Processing Sun 4 systems with RasterOps digitization and 24-bit color display. Tektronics stereo display.

Storage Technology Recording head models and measurements. Recording channel electronics. Recording media measurements and testing. The read/write process.

LOWER-DIVISION COURSE

50. Electric Circuits I

Physical basis and mathematical models of circuit components and energy sources. Circuit theorems and methods of analysis are applied to DC and AC circuits. Laboratory. *Prerequisite: Physics 6; corequisite: AMTH 106.* (5 units)

UPPER-DIVISION COURSES

100. Electric Circuits II

Continuation of ELEN 50, including sinusoidal steady state and phasors, transformers, three-phase circuits, resonance, Laplace analysis, transfer functions. Fourier Series. Laboratory. *Prerequisite: ELEN 50 or Physics 70.* (5 units)

104. Electromagnetics I

Static electric and magnetic fields and their sources and effects, including potential theory and the laws of Coulomb, Lorentz, Faraday, and Gauss. Introduction to vector analysis and differential operators. Dielectric and magnetic materials, capacitance and inductance, energy in

magnetic and electric fields, solutions to the Poisson equation. *Prerequisites: Physics 6 and ELEN 50; co-requisite: ELEN 100.* (4 units)

105. Electromagnetics II

Time harmonic electromagnetic fields. Introduction to complex vector operations. Maxwell's equations and the laws of Faraday and Gauss. Conservation of charge and power, Poynting vectors. Helmholtz wave equation, wave propagation. Boundary conditions and wave reflection and propagation, Snell's law. Transmission line theory, introduction to the Smith chart. Waveguides and radiation. *Prerequisite: ELEN 104 or Physics 111.* (4 units)

107. Information Storage Technology

Emphasis on magnetic data storage; technology, devices, and systems. Overview of alternative technologies. The recording process and electromechanical design trade-offs of moving media storage systems. Challenges faced in securing continuing cost/performance advances in terms of cost/bit, access time, transfer data rate, and reliability. *Prerequisites: ELEN 104 or Physics 111, and ELEN 180.* May be taken for graduate credit up to 12 units. (4 units)

109. Applications of Electromagnetics

Review of Maxwell's equations. Circuit elements and circuits. Non-ideal transmission lines. Boundary value problems. Conformal transforms. Waveguides. Resonant cavities. Microwave networks. Microwave materials. *Prerequisite: ELEN 105.* (4 units)

110. Linear Systems

Signals and system modeling. Laplace transform. Transfer function. Convolution. Discrete systems and Z-transform. Frequency analysis. Fourier series transform. Filtering. Problem sessions. *Prerequisite: ELEN 100.* (5 units)

111. Analysis of Linear Networks and Systems

Review of matrix algebra, elementary network topology, matrix foundation of system equations including network theorems, Laplace transform techniques, sinusoidal steady-state and frequency analysis. Computer-aided analysis and design. *Prerequisite: ELEN 100.* May be taken for graduate credit up to 12 units. (4 units)

112. Modern Network Synthesis and Design

Approximation, synthesis of passive one-port and two-port networks, linear operational amplifiers and active R-C synthesis. Nonlinear operational amplifiers: phase-locked loops, waveform generation. Design project. *Prerequisite: ELEN 110.* May be taken for graduate credit up to 12 units. (5 units)

114. Introduction to Topological Analysis

Introduction to topological analysis of linear networks and systems. Elementary network topology; planarity and duality; topological analysis of linear one-ports and two-ports; symbolic functions and sensitivity analysis; computer-aided topological analysis and optimization; introduction to topological synthesis and design. *Prerequisite: ELEN 100.* (4 units)

115. Electronic Circuits I

The p-n junction diodes, bipolar junction transistors (BJT), junction field effect transistors (JFET), metal-oxide-silicon field effect transistors (MOSFET). Study of physical behavior, modes of operation, terminal characteristics, and equivalent circuit models for each of these devices. Emphasis on using simplified models to perform rapid circuit analysis for a number of basic circuit configurations. Primary objectives: knowledge of the single transistor switch and the single transistor analog amplifier. *Prerequisite: ELEN 100.* (5 units)

116. Electronic Circuits II

Analog amplifiers. Differential amplifier using BJTs and MOSFETs. Amplifier output stages and integrated circuit (IC) power amplifiers. Detailed consideration of amplifier frequency response and wideband amplifier configurations. Practical circuit applications using negative feedback to enhance amplifier performances. Topics combined in the study of multistage (multitransistor) amplifier circuits. *Prerequisite: ELEN 115.* (5 units)

117. Electronic Circuits III

Introduction to BJT and MOSFET analog ICs. Detailed study of the popular 741 Operational Amplifier (OA), digital circuits and systems, as well as VLSI circuit design. Numerous specialized circuits including tuned amplifiers, oscillators and precision circuits using OAs. Detailed consideration of the internal operation of BJT and MOS digital circuits. *Prerequisite: ELEN 116.* (5 units)

119. Current Topics in Electrical Engineering

Subjects of current interest. May be taken more than once if topics differ. (4 units)

121. Logic Design

Basic switching circuit and logic design concepts. Noise margin, propagation delay, Boolean algebra. Minimization techniques, including Karnaugh maps and QM techniques. Combinational circuit design with MUXs, PLAs, and ROMs. Analysis of synchronous sequential circuits, counters, shift registers, etc. Use of CAD tools. (Also listed as COEN 121.) *Co-requisite: ELEN 121L.* (4 units)

121L. Logic Design Lab

Laboratory for ELEN 121. Design, development, and construction of digital circuits from word-problem statements. CAD approach to circuit design in lab. (Also listed as COEN 121L.) *Co-requisite: ELEN 121.* (1 unit)

122. Computer Architecture

Overview of computer systems, CPU design, computer arithmetic, microprogramming techniques, design of main memory, memory hierarchies and management, input/output subsystem organization, interrupt handling and DMA channels. Laboratory projects include design and implementation of a CPU based on a bit-slice microprocessor. (Also listed as COEN 122.) *Prerequisite: ELEN 124.* (5 units)

124. Introduction to Microprocessors

Overview of microprocessor organization, hardware-software trade-offs. Survey of microprocessor architectures and assembly languages, LSI memory chips, memory section design, LSI I/O techniques, interrupts, DMA channels, microcomputer development systems. (Also listed as COEN 124.) *Prerequisites: COEN 22 and ELEN 121; co-requisite: ELEN 124L.* (4 units)

124L. Microprocessor Lab

Laboratory for ELEN 124. (Also listed as COEN 124L.) *Co-requisite: ELEN 124.* (1 unit)

127. Advanced Logic Design

Contemporary design of finite-state machines as system controllers using MSI, PLDs, or FPGA devices. Minimization techniques, performance analysis, and modular system design. Design and analysis of asynchronous systems. (Also listed as COEN 127.) *Prerequisite: ELEN 121; co-requisite: ELEN 127L.* (4 units)

127L. Advanced Logic Design Lab

Laboratory for ELEN 127. Design, construction, and testing of controllers from verbal specs. Use of CAD design tools. (Also listed as COEN 127L.) *Co-requisite: ELEN 127.* (1 unit)

130. System Control and Design

Descriptions of control systems. The principle of feedback. Performance specifications: transient and steady-state response.

Stability: Routh-Hurwitz test. Design methods. Root-locus. Frequency response techniques of Nyquist, Bode, and Nichols. Lead and lag controller design. Laboratory. *Prerequisite: ELEN 110.* May be taken for graduate credit up to 12 units. (5 units)

131. Introduction to Robotics

Overview of robotics: control, AI, and computer vision. Components and structure of robots. Kinematics and dynamics of robot manipulators. Servo-control design, PID control. Trajectory planning, obstacle avoidance. Sensing and vision. Robot intelligence and task planning. Laboratory. *Prerequisite: ELEN 110.* (5 units)

133. Digital Signal Processing

Description of discrete signals and systems. Difference equations. Convolution summation. Z-transform, transfer function, system response, stability. Digital filter design and implementation. Introduction to C language implementations. Frequency domain analysis. Discrete Fourier transform and FFT. Laboratory for real-time processing. (Also listed as COEN 133.) *Prerequisite: ELEN 110.* May be taken for graduate credit up to 12 units. (5 units)

134. Applications of Digital Signal Processing

Extension of digital signal processing and digital filtering theory to modern applications. Design and analysis of digital filters and processing used in telephone systems digital audio and compact disc recording, and image processing. Implementations with special-purpose microprocessors and parallel architectures analyzed for real-time operations. (Also listed as COEN 134.) *Prerequisites: ELEN 133 and 141.* May be taken for graduate credit up to 12 units. (4 units).

139. Special Topics in Signals and Systems

Subjects of current interest. May be taken more than once if topics differ. (4 units)

141. Communication Systems

Signal description; Fourier transforms; filtering; noise description; linear, exponential, and pulse modulation and demodulation. Laboratory. *Prerequisite: ELEN 110.* May be taken for graduate credit up to 12 units. (5 units)

144. RF and Microwave Components

Passive and active electrical components used in radio frequency and microwave circuits. Emphasis on fundamental characterization of components. Parasitics, models, and measurements. Resistors, inductors, capacitors, transmission lines, diodes, transistors. *Prerequisite: ELEN 105.* May be taken for graduate credit up to 12 units. (5 units)

145. RF and Microwave Circuits

Design, construction, and testing of typical RF and microwave circuits including filters, amplifiers, and oscillators. System measurements. *Prerequisite: ELEN 144.* May be taken for graduate credit up to 12 units. (5 units)

151. Semiconductor Devices I

Materials properties, crystal structure, and band structure of semiconductors. Carrier statistics and transport; p-n junction statics, I-V characteristics, equivalent circuits, and switching response. Metal-semiconductor contacts, Schottky diodes. Metal-semiconductor field-effect transistors, junction field-effect transistors. Laboratory. *Prerequisites: Physics 7 and ELEN 104 and 115.* (5 units)

152. Semiconductor Devices II

Metal-oxide-semiconductor field-effect transistors, bipolar junction transistors, heterojunctions. Principles of silicon IC fabrication processes and design. Bulk and epitaxial crystal growth, thermal oxidation, diffusion, ion implantation. Process simulation for basic devices. *Prerequisite: ELEN 151.* (5 units)

153. Digital Integrated Circuit Design

Analysis and design of digital MOS and bipolar integrated circuits. Based on first-order nonlinear device models, hand calculations and computer simulations (SPICE) used to design gates and SSIs. Circuit modeling considerations. Circuit performance evaulation with computer-aided circuit analysis. Design of MSIs from flowchart to layout. PLAs and finite state machines using array logic. Introduction to system design. (Also listed as COEN 153.) *Prerequisites: ELEN 115 and 121.* (5 units)

154. Integrated Circuit Fabrication and Characterization

Principles and practice of IC fabrication and characterization of basic semiconductor devices with experiments on oxidation, diffusion, ion implantation, lithography, etching and cleaning, metallization, film deposition, process simulation, process integration, and parameter extraction. Conducted in the Microelectronics Laboratory clean-room facility. Course consists of two hours lecture and *two* three-hour labs per week. *Prerequisite: ELEN 152.* (5 units)

160. Principles of Electrical Machines

Analysis of specialty machines used in control systems such as voice coil motors, stepping motors, and P.M. motors. Introduction to electronic drive systems as applied to motor control. *Prerequisite: ELEN 100.* (5 units)

161. Advanced Electrical Machine Theory

Principles of electrical machines. Introduction to magnetic circuits, induction machines, and three-phase synchronous machines. *Prerequisite: ELEN 100.* (5 units)

162. Electric Power Systems

Systems that transmit electrical energy from the point of generation to the point of use. Three-phase systems. Faults. Load flows. System modeling for computer solutions. *Prerequisite: ELEN 100 or equivalent.* May be taken for graduate credit up to 12 units. NCX† (4 units)

164. Introduction to Power Electronics

Development of models utilizing semiconductor materials used in high-current and/or high-voltage applications. Models include DC to DC converters, AC to DC converters, and DC to AC inverters. Analysis of power amplifiers. SPICE implementations of models. *Prerequisite: ELEN 115.* (5 units)

180. Introduction to Information Storage

Storage techniques and mass storage devices. Use of memory in computer systems. Design of semiconductor, magnetic and optical (disk drives), and magnetic tape memories. Storage controllers, computer interfaces, system software interfaces. Emphasis on current mass storage devices and interfaces: SCSI, IPI, ST506, ESDI. (Also listed as COEN 180.) *Prerequisites: COEN 22 and ELEN 121; ELEN 122 recommended.* (4 units)

188. Co-op Education I

Integration of classroom study and practical experience in a planned program designed to give students practical work experience relating to their academic field of study and career objectives. Alternate or parallel periods of classroom study with periods of training in industry and government. Work includes overall report on assignment activities. P/NP grading. May be taken twice. May be taken for graduate credit. Additional fees required. (2 units)

† Exempted from challenge

189. Co-op Education II

Credit given for a technical report on a specific activity such as a design or a research project, etc., after completing the co-op assignment. Approval of department co-op adviser required. Letter grades based on content and presentation quality of report. May be taken twice. May be taken for graduate credit. (2 units)

194. Design Project I

Specification of an engineering project, selected with the mutual agreement of the student and the project adviser. Complete initial design with sufficient detail to estimate the effectiveness of the project. Initial draft of the project report. *Prerequisite: English 182.* (2 units)

195. Design Project II

Continued design and construction of the project, system, or device. Second draft of project report. *Prerequisite: ELEN 194.* (2 units)

196. Design Project III

Continued design and construction of the project, system, or device. Final report. *Prerequisite: ELEN 195.* (2 units)

199. Independent Study

Open to department scholars only. (1–6 units)

DEPARTMENT OF MECHANICAL ENGINEERING

Professors Emeriti: Eugene J. Fisher, R. Ian Murray, Richard K. Pefley
Professors: Mark D. Ardema *(Chair)*, Michel A. Saad, Terry E. Shoup, James W. White
Associate Professors: Timothy K. Hight, Lee E. Hornberger
Assistant Professors: Lilia A. Sanchez, T. Gary Yip
Adjunct Professors: Joseph T. Ma, P. K. Menon
Research Professor: Sam D. Haddad
John M. Sobrato Professor: Terry E. Shoup
David Packard Fellow: Lee E. Hornberger

Mechanical engineering includes all aspects of design, development, control, and manufacture of mechanical systems and energy conversion systems. The undergraduate curriculum addresses the education and training of mechanical engineering students and concentrates on two technical areas: (1) design and analysis of thermofluid systems for effective use of energy; and (2) design, analysis, and control of mechanical systems including the study of materials used in engineering. Educational efforts are channeled to expand the skills of prospective engineers not only in understanding fundamentals but also in developing competence in analyzing engineering systems.

LOWER-DIVISION COURSES

10. Introduction to Engineering Graphics

Principles of orthographic projection, dimensioning, sectioning; isometric and auxiliary views. Descriptive geometry applied to representation and visualization. Computer-aided design using engineering workstations. (4 units)

11. Machine Tool Processes

Material properties and changes of these properties during processing. Use of machine tools to produce various mechanical items. Laboratory. (5 units)

15. Introduction to Material Science

Physical basis of the electrical, mechanical, and thermal behavior of solids. Relations between structural and physical properties. Theory of dislocations, vacancies, and other defects and their effect on physical properties. Illustrations of the relationships among material selection, manufacturing processes, and design. Laboratory. *Prerequisites: MECH 11, Chemistry 6, and Physics 6.* (5 units)

UPPER-DIVISION COURSES

114. Machine Design I

Decision making in the solution of problems. Stress and deflection analysis are emphasized in the first part of the course; strength criteria are considered in the second part. One or two open-ended design projects. *Prerequisites: MECH 15 and CENG 43.* (4 units)

115. Machine Design II

Continuation of MECH 114. The solution of practical mechanical design problems. Design of components to withstand static and fatigue loading. *Prerequisite: MECH 114.* (4 units)

121. Thermodynamics I

Properties of pure substances. Work and heat. First and second laws of thermodynamics. Application to fixed mass systems and control volumes. Irreversibility and availability. *Prerequisite: Physics 6.* (4 units)

122. Fluid Mechanics I

Fluid properties and definitions. Fluid statics, forces on submerged surfaces, manometry. Streamlines and the description of flow fields. Euler's and Bernoulli's equations. Mass, momentum, and energy analysis with a control volume. Laminar and turbulent flows. Losses in pipes and ducts. Dimensional analysis and similitude. Laboratory. *Prerequisite: CENG 42.* (5 units)

123. Heat Transfer

Introduction to the concepts of conduction, convection, and radiation heat transfer. Application of these concepts to engineering problems. *Prerequisites: MECH 121 and 122.* (4 units)

131. Thermodynamics II

Thermodynamic potentials and availability concepts. Thermodynamic cycles. Nonreactive mixtures. Reactive mixtures with emphasis on the thermodynamics of combustion and chemical equilibrium. Laboratory. *Prerequisite: MECH 121.* (5 units)

132. Fluid Mechanics II

Introduction to gas dynamics. Concepts of lift and drag. Mechanics of laminar and turbulent flow. Introduction to boundary-layer theory. Application to selected topics in lubrication theory, aerodynamics, turbomachinery, and pipe networks. *Prerequisites: MECH 121 and 122.* (4 units)

133. Thermofluid System Design

Evaluation and selection of thermofluid system components such as compressors, fans, heat exchangers, internal combustion engines, and turbines. Application of mathematical, economic-cost techniques and availability analysis to the synthesis, design, and evaluation of thermofluid system projects. Emphasis on an actual design project. *Prerequisites: MECH 123, 131, and 132.* (4 units)

140. Intermediate Dynamics

Motion in rotating reference frames. Angular momentum of rigid bodies. Moments and products of inertia. Gyroscopic motion. *Prerequisite: CENG 42.* (4 units)

141. Introduction to Linear Systems

Fundamental characteristics of linear systems via analysis of simple electrical and mechanical models. Forced and natural response. Introduction to Laplace transforms and their use in mechanical vibrations, circuit analysis, and electromechanical systems such as AC/DC motors. Laboratory. *Prerequisites: MECH 140 and AMTH 106.* (5 units)

142. Control Systems Analysis and Design

Modeling of physical systems. Analysis of linear feedback control systems by classical methods. Synthesis and design of control systems that satisfy certain stability and time-response criteria. Introduction to analysis and design by state-space methods. *Prerequisite: MECH 141.* (4 units)

143. Electromechnical Systems and Components

Machine dynamics, transfer functions, and modeling of physical electromechanical systems. Applications and laboratory. *Prerequisites: MECH 142 and ELEN 50.* (4 units)

145. Introduction to Aeronautical Engineering

Basic design and analysis of atmospheric flight vehicles. Principles of aerodynamics, propulsion, structures and materials, flight dynamics, stability and control, mission analysis, and performance estimation. Conceptual and preliminary design of various aircraft. *Prerequisites: MECH 121, 122, and 140.* Offered every other year. (4 units)

151. Finite Element Theory and Applications

Basic introduction to finite elements; direct and variational basis for the governing equations; elements and interpolating functions. Applications to general field problems—elasticity, fluid mechanics, and heat transfer. Extensive use of software packages. *Prerequisites: COEN 4 or 44 and AMTH 106.* Offered every other year. (4 units)

160. Mechanical Engineering Laboratory

Introduction to design of experiments, instrumentation, data acquisition, error analysis, and report writing. *Prerequisites: English 182, MECH 122, and senior standing.* (4 units)

188. Co-op Education I

Integration of classroom study and practical experience in a planned program designed to give students practical work experience relating to their academic field of study and career objectives. Alternate or parallel periods of classroom study with periods of training in industry and government. Work includes overall report on assignment activities. P/NP grading. May be taken twice. May be taken for graduate credit. Additional fees required. (2 units)

189. Co-op Education II

Credit given for a technical report on a specific activity such as a design or a research project, etc., after completing the co-op assignment. Approval of department co-op adviser required. Letter grades based on content and presentation quality of report. May be taken twice. May be taken for graduate credit. (2 units)

190. Independent Study

Investigation of a mechanical engineering problem and presentation of the results. Arrangement with a faculty adviser is required. *Prerequisite: senior standing.* (2–4 units)

193. Computer Design Workshop

An interdisciplinary workshop for engineering, art, and communication students. Graphics computers and software. Students work in teams to explore solutions to important social problems, use computers to illustrate solutions, and complete formal presentations of their findings. Limited enrollment. *Prerequisite: permission of instructor.* (Also listed as Art 193 and Comm 193.)

194. Advanced Design I: Tools

Design tools basic to all aspects of mechanical engineering, including computer-design tools. CAD, finite element method, simulation, CAM/robotics, engineering economics, and decision making. Senior design projects begun. *Prerequisite: MECH 115.* (4 units)

195. Advanced Design II: Implementation

Implementation of design strategy. Detail design and fabrication of senior design projects. Quality control, testing and evaluation, standards and specifications, and human factors. *Prerequisite: MECH 194.* (4 units)

196. Advanced Design III: Completion and Evaluation

Design projects completed, assembled, tested, evaluated, and judged with opportunities for detailed re-evaluation by the designers. Final written report required. *Prerequisites: MECH 195 and English 182.* (4 units)

199. Directed Research

Investigation of an engineering problem and writing an acceptable thesis. Conferences as required. *Prerequisite: senior standing.* (2–4 units)

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Division of Counseling Psychology and Education

Professor: Ruth E. Cook
Associate Professors: Kenneth E. Blaker, Brian P. Hall, Joyce E. King, Jerome A. Kroth, Dale G. Larson, Jerrold L. Shapiro, Jo Ann Vasquez *(Dean),* William W. Yabroff
Assistant Professors: Sara Soledad Garcia, Mary Anne Wakefield
Lecturers: Steve A. Johnson, S.M., Lee Mahon

TEACHER EDUCATION AT SANTA CLARA

Santa Clara University is accredited by the California Commission on Teacher Credentialing to offer professional preparation for prospective elementary school and junior and senior high school teachers. The Teacher Education programs at Santa Clara consist of the Multiple-Subject Credential (elementary grades) and the Single-Subject Credential (junior and senior high school levels). These credential programs provide extensive experience in schools as well as a diversified course of study in educational theory and practice. The Basic Teaching Credential program (multiple-subject or single-subject) can be completed as a fifth year of graduate study or as part of the four-year baccalaureate program. Other credential programs offered by the Division of Counseling Psychology and Education include a Learning Handicapped Specialist Credential, a Resource Specialist Certificate, a Pupil Personnel Services Credential, and an Administrative Services Credential. Some credentials require first obtaining a basic teaching credential. The California Preparation and Licensing Law of 1970 (commonly referred to as the Ryan Act), the Hughes-Hart Reform Act of 1983 (SB-813), and the Teacher Education Bergeson Act of 1988 (SB-148) guide policy in teacher preparation at Santa Clara.

Dr. Joyce E. King, Division of Counseling Psychology and Education, is the director of Teacher Education. The coordinator of Teacher Education is Dr. Jane Lubin. Dr. Ruth Cook is the director of Special Education programs. Drs. King, Lubin, and Cook can be contacted through 226 Bannan Hall.

UNDERGRADUATE PREPARATION FOR TEACHING CAREERS

Preparation for Multiple-Subject Credential Program

Students interested in a career in elementary school teaching should fulfill the requirements of the liberal studies major in the College of Arts and Sciences. For

specific course requirements, see Liberal Studies in this bulletin, or contact the coordinator, Patricia J. Bendigkeit, Department of Communication. Students who have not completed this approved program may still qualify for admission to the Multiple-Subject Credential program by passing the Multiple-Subject Assessment for Teachers (MSAT).

Preparation for Single-Subject Credential Program

Students interested in secondary teaching of a particular subject may fulfill the requirements of one of 10 approved single-subject, subject-matter preparation programs at Santa Clara. These subject categories include biology, chemistry, combined sciences, English, history,* physics, political science, Spanish, French, and German. Students should indicate their interest in teaching to the appropriate adviser within their major and ask to see the *Academic Guide for Preteaching Majors.* Students who do not complete one of the approved single-subject, subject-matter preparation programs, but are interested in a teaching career, must instead pass the National Teacher Examination in the appropriate subject area(s). Some subject areas also require the CAPA (Content Area Performance Assessment) examination. Students interested in teaching a subject not listed here should contact the department chair or the Division of Counseling Psychology and Education for information.

California teaching credentials are also available in the following subject areas: agriculture, art, business, government,* health science,* home economics, industrial arts, life science, music, physical education, physical science, and social science. Students who wish to obtain a credential in an area for which Santa Clara does not offer an approved single-subject, subject-matter preparation program must pass subject-area examinations in that subject.

Minimum Requirements for Multiple- and Single-Subject Credentials

The minimum requirements for each teaching credential include (1) a baccalaureate or higher degree in a subject area (not in professional education) from an accredited institution; (2) completion of an approved program of professional education, including student teaching; (3) completion of a state-approved subject-area major or passage of a subject-matter examination (in the area one plans to teach); (4) demonstration of a knowledge of the various methods of teaching reading by completion of course work or passage of an approved examination; and (5) passage of the California Basic Educational Skills Test (CBEST).

Information regarding subject-area examinations is available from the Division of Counseling Psychology and Education, 213 Bannan Hall. It is strongly advised that subject-area examinations be passed prior to entering the program.

A *Clear Teaching Credential* may be earned by meeting the minimum requirements plus the additional requirements of a fifth year of study; a course in

*No examination available

health education, a course in teaching children with exceptional needs in the regular classroom, approved course work in computer education, and course work or an examination on the provisions and principles of the U.S. Constitution. History 7 or 171 or Political Science 1 or 157 satisfies the U.S. Constitution requirement.

Note: Students are encouraged to complete an approved health education course prior to enrollment in the credential program. Contact the Division of Counseling Psychology and Education, 213 Bannan Hall, for information.

FOUR-YEAR CREDENTIAL PROGRAM

The Multiple-Subject or Single-Subject Credential program can be taken at Santa Clara in a student's senior year. Students who complete all the University and major requirements by the end of their junior year are eligible to apply for entrance to the Teacher Education program during their senior year. Upon graduation from Santa Clara after four years of study, these students obtain a *Preliminary Teaching Credential.* Since a *Clear Teaching Credential* requires an additional fifth year of study, these students must complete an additional 45 quarter units of an approved program within five years. Courses and requirements for four-year students and students completing a credential program in their fifth year of study are the same.

FIFTH-YEAR CREDENTIAL PROGRAM

The Multiple-Subject or Single-Subject Credential program is generally taken as a fifth year of study following the baccalaureate and qualifies the student for a *Clear Teaching Credential.* This 45-quarter-unit program includes graduate course work in educational foundations, curriculum design, teaching methods, and supervised student teaching. For further information, consult the *Counseling Psychology and Education Graduate Programs* bulletin available in 213 Bannan Hall.

ADMISSION REQUIREMENTS

Admission requirements for the credential program are as follows:

1. an overall grade point average of 2.75, with a 3.0 in the academic major;
2. a positive attitude toward the teaching profession and its responsibilities;
3. demonstrated competence in reading, writing, and speaking English as attested to by course work, a recently written paper, or a recommendation from the applicant's major adviser;
4. absence of criminal conviction that would preclude the issuance of a teaching credential;
5. three letters of recommendation from the following:
   a. at least one professor from the student's major field (preferably the student's major adviser)

b. teachers who have supervised the student's practicum work in the elementary or secondary school
c. employers or professional colleagues who are well acquainted with the student's skills in working with youth

6. verification of successful practicum work and/or experience with children or youth groups (e.g., 98/198A or B);
7. an interview with the director of Teacher Education and other faculty members;
8. a written statement, which may be completed at the time of the interview, citing the candidate's reason for entering the teaching profession; and
9. submission of recent GRE or GMAT test scores and CBEST scores.

Note: It is highly recommended that applicants complete the subject-matter requirement either through an approved program or by passing subject-matter examination(s) before beginning a credential program.

Applicants to the credential program may apply any time between Dec. 1 and April 1 for admission the following September. Application forms are available from the Division of Counseling Psychology and Education, 213 Bannan Hall.

EARLY ADMISSION FOR SENIORS

Early admission to the fifth-year credential program is available to seniors who wish to apply during the fall quarter. Applications are processed as soon as the student's file is complete. Students receive early notification of admission for the following September and are assured a place in the program. Applications are accepted any time after Oct. 1.

Since enrollment in the Teacher Education program is limited, accepted candidates must reserve a place in the program with a $50 deposit before June 1. This nonrefundable deposit will be applied to the candidate's tuition.

PAUL DOUGLAS TEACHER SCHOLARSHIP PROGRAM

The Paul Douglas Teacher Scholarship Program, formerly the Congressional Teacher Program, is an incentive program designed to attract and commit students to the teaching profession. The program awards up to $5,000 per year for a maximum of four years. Freshmen, sophomores, juniors, seniors, and fifth-year students who are enrolled in an approved curriculum leading to a teaching credential are eligible. Information about this program is available from the Division of Counseling Psychology and Education, 213 Bannan Hall.

COURSE DESCRIPTIONS

The Division of Counseling Psychology and Education offers the following undergraduate courses. Consult the *Counseling Psychology and Education Graduate Programs* bulletin available in 213 Bannan Hall for a description of courses in the credential programs.

EDUCATION

98/198A. Introduction to Elementary School Teaching: Practicum

98/198B. Introduction to Secondary School Teaching: Practicum

Opportunity to work as teacher aides in elementary and secondary classrooms. Weekly seminars and directed readings address field-related problems and issues, classroom dynamics, and curriculum. Offered each quarter.

98C. Tutoring in Elementary and Secondary Schools

Opportunity to work as a tutor with identified elementary and secondary students who need personal attention to improve their literacy levels. Weekly seminars address tutoring experiences and relevant issues in education. Class is supported by a Student Literacy Grant from the U.S. Department of Education. Applicants will be interviewed and accepted prior to first class session. Offered winter and spring quarters only.

119. Psychology of Education

Psychological principles on which effective classroom practices can be based. Human growth and development, learning theory and practice, motivation and management, effective instruction, and evaluation. Development of psychological case studies as part of the field experience. Open to sophomores.

138. The Exceptional Child

Introduction to childhood mental retardation, learning disabilities, behavior disorders, communication (speech and language) disorders, hearing impairments, physical and health impairments, severe handicaps, and the gifted and talented. The impact of these differences compared to normal development. Visits to institutions that serve these children. Particularly applicable for students interested in careers in social work, rehabilitation, education, medicine, psychology, counseling, and parenting.

163. Introduction to Teaching in a Multicultural Society[§]

Exposure to the diversity of cultures present in U.S. public schools. Alternative instructional approaches and learning styles. Discussion of issues such as bilingual/bicultural education, cross-cultural/intercultural communication, and multicultural curriculum in conjunction with field experiences in local public schools. *Satisfies the multicultural perspective requirement.* Open to sophomores.

COUNSELING PSYCHOLOGY

140. Psychology of Intimacy

Specifically designed to investigate the needs for, and difficulties in, finding and maintaining intimate relationships in modern culture. Using their own family backgrounds as a basis, students explore the nature, scope, and communication involved in psychological intimacy. Common blocks and fears of intimate relating are described and traced. Novel approaches to finding and keeping intimate partnerships are discussed.

[§] Course included in Ethnic Studies program

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Other Programs

The University offers a number of special programs to complement the degree programs listed under the undergraduate schools and college. Generally interdisciplinary in nature, these programs are available to all undergraduate students. Interested students are encouraged to contact the individual program directors early in their academic career at Santa Clara.

HONORS PROGRAM

Arthur F. Liebscher, S.J., Ph.D. *(Director)*

The Honors Program provides a learning experience appropriate to students of exceptional talent and imagination. It offers liberal education and small, seminar-style classes, especially in the University's core requirements. It also presents opportunities for advanced, interdisciplinary learning as students pursue their chosen fields of study. The Honors Program is organized as two distinct but related programs: the Freshman Honors Program and the University Honors Program. Participation in each is open to undergraduate students from Arts and Sciences, Business, and Engineering. Successful completion of the Freshman and/or University Program becomes part of a student's permanent record and appears on academic transcripts issued by the University.

Students are admitted to the Freshman Honors Program at the time of their admission to the University. Admission is by invitation and is based on the student's high school record, test scores, and other information contained in the application for admission to the University. Normal eligibility criteria for admission include a combined SAT score of 1200 and above and a high school grade point average of 3.5 or higher; satisfying these criteria, however, does not guarantee admission to the program. Students in the program complete six honors courses during the freshman year. Courses offered in the Freshman Program satisfy University Curriculum requirements and typically include courses in composition, ethics, mathematics, the natural and social sciences, religious studies, and Western culture.

The University Honors Program is open to sophomores, juniors, and seniors. Students are admitted to the University Program on the basis of their academic records at Santa Clara and the recommendations of their professors. Qualifying students in the Freshman Program may continue to the University Program; they should complete four additional Honors Program courses and a senior thesis or project. Others may apply as early as the third quarter of their first year. These new students should take six Honors Program courses and fulfill the thesis or

project requirement. In either case, the thesis may be undertaken in conjunction with the student's major. The seminars in the University Program address subjects and themes not easily treated by departmental courses. These questions include the boundaries and connections between different areas of knowledge and other interdisciplinary problems.

The University Honors Program currently offers a scholarship for one student to spend his or her junior year at Mansfield College, Oxford. This scholarship is awarded on a competitive basis and is limited to students in the program.

Students interested in either the Freshman or the University Program should write to the Director, Honors Program, Santa Clara University, Santa Clara, CA 95053, or call 408-554-4439.

HONORS COURSES

11. Classical Culture

12. Medieval and Early Modern Culture

13. Late Modern Culture

A series of interdisciplinary seminars on Western culture from the ancient Greeks to the present. Enrollment limited to students in the Freshman Honors or University Honors programs. Satisfies the Western Culture requirement.

100. Honors Seminar

An advanced, interdisciplinary seminar on a topic of importance to liberal education. May be repeated for credit when topic changes. Enrollment limited to students in the University Honors Program.

199. Honors Program Thesis

Course credit for thesis or culminating project of the University Honors Program. For students who do not enroll for a thesis or research course in one of the instructional departments of the University.

In addition to the Western Culture sequence (11, 12, and 13), the Honors Program offers special courses and sections in biology, chemistry, economics, English, history, mathematics, philosophy, psychology, and religious studies.

INTERNATIONAL PROGRAMS

Dennis R. Gordon, Ph.D. *(Director)*

International Programs provides a variety of academic programs and services to Santa Clara University and the community. Along with the programs described below, International Programs presents lectures, forums, cultural events, and other activities exploring the world from an interdisciplinary perspective.

INTERNATIONAL BUSINESS EMPHASIS

International Business is a University program designed to educate students in a broad range of management and international business skills and to offer an

understanding of the culture, history, and politics of a selected geographic area. Students select an area of geographic specialization (Europe, East Asia, or Latin America and the Caribbean) and are assigned a faculty adviser who shares their field of interest.

International Business is open to all undergraduates in the College of Arts and Sciences and the Leavey School of Business and Administration as a supplement to their major. Program requirements include proficiency in a language of the geographic area of concentration (usually through the 101 level); a selection of courses in modern history, business ethics, political science, and contemporary culture; and a selection of courses in international economics, finance, marketing, and management.

Completion of the International Business emphasis is indicated on the student's transcript, and students are awarded a certificate noting their accomplishment.

INTERNATIONAL STUDIES MINOR

International Studies is a University program designed for students wishing to concentrate course work beyond their majors in a multidisciplinary study of international social, economic, cultural, and political topics. The program is open to all SCU undergraduates.

Students organize their courses in one of two ways: an *area studies* focus on one of three geographical areas (Europe, Latin America and the Caribbean, or East Asia); or a *thematic* focus of their choice, such as poverty and development, diplomacy and law, or peace studies. Students must also complete two upper-division language courses in a language appropriate to their area of interest and other selected core requirements in anthropology, geography, and political science.

Completion of the minor is indicated on the student's transcript, and students receive a certificate noting their accomplishment.

STUDIES ABROAD

Santa Clara provides opportunities for study throughout the world. The University operates or is affiliated with numerous programs, including sites in Latin America, Europe, and Asia. Programs are available for one semester, a full year, or summer and offer courses of study in many fields, including the humanities, social sciences, and business. Students should begin exploring study abroad opportunities during their freshman year. With planning and forethought, programs can be arranged for most majors.

All Studies Abroad applicants must be currently enrolled at the University and have at least sophomore status. To ensure the academic quality of the study abroad and transfer of credit, it is recommended that students participate only in programs formally affiliated with Santa Clara University. Approval of the student's academic adviser and the director of International Programs is required for admission to approved Studies Abroad programs.

Information about International Business, International Studies, and Studies Abroad may be obtained from the International Programs Office, 202 O'Connor Hall (408-554-6940).

ETHNIC STUDIES

Stephen S. Fugita, Ph.D. *(Director)*

Associate Professors: Ramon D. Chacon, History/Ethnic Studies;
Stephen S. Fugita, Psychology/Ethnic Studies;
Alma M. Garcia, Sociology/Ethnic Studies
Assistant Professor: Dwight N. Hopkins, Religious Studies/Ethnic Studies

The Ethnic Studies program offers interdisciplinary courses and coordinates racial/ethnic studies courses taught by academic departments. It also assists departments in developing courses that integrate scholarship about racial/ethnic groups into their curricula. The focus of the program is on African Americans, Asian/Pacific Islander Americans, Chicanos, and Native Americans and their roles in the development of the United States. Therefore, the program provides an opportunity for all students to gain an understanding of racial/ethnic minority cultures and for students of color to study their own cultural heritage and history. The program offers a minor in ethnic studies. Please contact the program office for further details.

LOWER-DIVISION COURSES

10. Native American Cultures

A multidisciplinary course addressing key issues regarding identity and definition among indigenous peoples in the United States. How members of each group view themselves; how they are defined by others; how interactions between the different cultures influence one another.

20. Chicano Culture

Multidisciplinary survey of Chicano culture. Mexican cultural heritage and traditional folk culture. Chicano world views and values, religious beliefs, family and kinship, language, and contemporary community issues of identity, sex roles and stereotyping, immigration, housing, employment, and education.

30. African American Culture

Multidisciplinary survey of African American culture. African cultural heritage and African survivals. World views and values, religious beliefs, family and kinship, language. Contemporary community issues of identity, sex roles and stereotyping, housing, employment, and education.

31. African American Slave Theology

A creative engagement with one of the most untapped U.S. religious resources—African American slave narratives during the pre-Civil War period. The religious dimensions of slave families.

34. Theatre of Black America

A survey course emphasizing the works of black playwrights in the United States from the 1940s to the present. Focuses on the expression of sociological, economic, educational, religious, and psychological

forces contained in the rich and varied literature of black theatre.

40. Asian American Culture

Introduction to Asian American studies. Historical, political, sociological, and psychological analyses. Topics include immigration; economic accommodation; and contemporary community, family, and identity.

90. Racism in the United States

Multidisciplinary study of racism in the United States. Its historical manifestations from the arrival of Europeans in North America to contemporary times; its psychological dimensions (prejudice, stereotypes, discrimination); and its place in the U.S. political economy (capitalism). Emphasis on African Americans, but includes discussion of Native Americans, Chicanos, and Asian Americans.

UPPER-DIVISION COURSES

112. Native Peoples of the United States and Mexico

120. Mexican Immigration to the United States

121. Chicano Family

(Also listed as Women's Studies 121.)

122. Chicano Community

131. Spirituality in Toni Morrison's Novels

136. Black Theology in the United States

138. Life and Theology of Martin Luther King Jr. and Malcolm X

140. Japanese Americans and the Concentration Camps

141. Asian American Women

142. Asian America: Contemporary Issues

DEPARTMENTAL COURSES

23. Chicano Theatre

See Theatre 23.

27. Intercultural Communication

See Communication 27.

35. African American Literature

See English 35.

36. Chicano Literature I

See English 36.

37. Native American Literature

See English 37.

40. Social Forces in Politics

See Political Science 40.

69. Women's Literature: Third World Women Writers in the United States

See English 69.

71. Music in American Culture

See Music 71.

81. Chicanos in the Southwest

See History 81.

83. Asian Americans

See History 83.

86. Native American Cultures

See Anthropology 86.

90A. Cross-cultural Study of Women

See Anthropology 90.

90B. Spirituality in Toni Morrison's Novels

See Religious Studies 90. Cross-listed as Ethnic Studies 131.

91. African American Slave Theology

See Religious Studies 91. Cross-listed as Ethnic Studies 31.

109. African Americans and Africa

See History 109 (World and Comparative History).

119. Minority Mental Health

See Psychology 119.

126. Black Theology in the United States

See Religious Studies 126. Cross-listed as Ethnic Studies 136.

128. Life and Theology of Martin Luther King Jr. and Malcolm X

See Religious Studies 128. Cross-listed as Ethnic Studies 138.

132. Social Stratification

See Sociology 132.

140. Chicano Literature II

See English 140.

150. Ethnic Enterprises

See Sociology 150.

153A. Ethnic Politics

See Political Science 153.

153B. Race, Class, and Gender in the United States

See Sociology 153.

156. Prejudice and Discrimination

See Psychology 156.

163. Introduction to Teaching in a Multicultural Society

See Education 163.

166. Pan-African Literature

See English 166.

175. Race and Inequality

See Sociology 175.

185. Native Americans of the United States

See History 185.

187. Native American Cultures of the Pacific Coast

See Anthropology 187.

WOMEN'S STUDIES

Alma M. Garcia *(Director)*

The Women's Studies program offers both women and men students opportunities to study the experiences, contributions, and cultural images of women while working toward a degree in a traditional academic discipline. The program consists of courses given by various undergraduate departments. The program encourages the development of new courses and of faculty research specifically concerned with women. Its office serves as a resource center for the academic community.

107. Women in Mathematics and Science

Early biological theories of gender differences. Women's contributions in the sciences from the development of the sciences to the present day. Feminist theory relative to the sciences.

DEPARTMENTAL COURSES

30. Studies in American Literature

See English 30. Selected topics that focus on women authors.

36. Gender in Human Development

See Psychology 36.

68. Women's Literature

See English 68.

69. Women's Literature: Third World Women Writers in the United States

See English 69.

72. Women in the Biblical Traditions

See Religious Studies 72.

88. Women in the Middle East

See Anthropology 88.

90. Cross-cultural Study of Women

See Anthropology 90.

102. Feminist Theology

See Religious Studies 102.

121. Chicano Family

See Ethnic Studies 121.

125A. Feminist Theory and Criticism

See English 125.

125B. Medieval European Women

See History 125.

127. Women in Europe

See History 127.

135. Women and Social Change in Latin America

See Sociology 135.

144. Women in Islamic and African Societies

See History 144.

153. Race, Class, and Gender in the United States

See Sociology 153.

154A. Women and Politics

See Political Science 154.

154B. Women in Asia

See History 154.

157. Family and Kinship

See Anthropology 157 and Sociology 157.

168A. Women's Literature

See English 168.

168B. Gender and Religion in Asia

See Religious Studies 168.

182A. Family in U.S. History

See History 182.

182B. Women in French Literature: Authors and Characters

See French 182.

182C. Women in German Literature: Authors and Characters

See German 182.

182D. 20th-Century Italian Women Writers

See Italian 182.

182E. Japanese Women's Literature in Translation

See Japanese 182.

183. 20th-Century French Women Writers

See French 183.

184. Women in American Society

See History 184.

184, 185. Seminar in American Politics

See Political Science 184, 185. Occasional seminars offered in women in American politics.

185. Women in Antiquity

See Classics 185.

189. History of Women Artists

See Art 189.

ENVIRONMENTAL STUDIES

Janice S. Edgerly-Rooks, Ph.D. *(Co-director)*
Amy M. Shachter, Ph.D. *(Co-director)*

The environmental studies minor supplements a wide variety of majors, from anthropology to physics, and can easily be completed by students in both the College of Arts and Sciences and the Leavey School of Business and Administration. (Engineering students should consult their advisers.)

Students select eight courses in the first five categories shown below, and gain further breadth by choosing two electives from an extensive list available from an adviser. The minor is also enriched by quarterly colloquia on environmental themes, featuring presentations by journalists, politicians, businesspeople, scientists, and other scholars. Students are required to attend six of these special presentations during their participation in the program. The minor culminates in the Capstone Course where seniors from diverse majors grapple with environmental issues.

Each student works with an adviser chosen from the Program Council who helps coordinate the environmental studies curriculum with the student's major and plan for future study and/or work in environmental fields, if he/she so desires.

Completion of the program is noted on the student's official transcript, and all graduates receive a certificate acknowledging their accomplishment.

REQUIREMENTS FOR MINOR

In addition to the University Curriculum and College requirements for the Bachelor of Science or Bachelor of Arts, students must complete the following requirements:

1. *Scientific Foundations*
   a. One statistics course chosen from Math 8, Decision and Information Sciences 40, or Psychology 40
   b. Two courses chosen from Chemistry 1 (Chemistry and the Environment), General Engineering 15 (Environmental Quality Engineering), Physics 51 (Introduction to Earth Sciences), Civil Engineering 143 (Environmental Engineering), and Chemistry 111 (Instrumental Methods of Analysis)
   c. One course chosen from Biology 43 (Human Ecology), Biology 44 (Endangered Ecosystems), or Biology 91 (Populations)
2. *Ethics* One course from either Philosophy 9 or 109 (Ethics and the Environment)
3. *Economic Dimension* Agribusiness/Economics 101 (Resources, Food, and the Environment)
4. *Social/Cultural Dimension* One course chosen from Anthropology 144 (Cultural Anthropology), Sociology 138 (Population and Resources), or Anthropology/Political Science 50 (World Geography)
5. *Political/Legal Dimension* One course chosen from Political Science 196 (Seminar in International Relations) or Environmental Studies 120 (Introduction to Environmental Law and Regulation)
6. *Electives* Two courses chosen from list provided by an environmental studies adviser
7. *Capstone Seminar* Environmental Studies 101
8. *Colloquia* Attendance at six presentations required (see adviser for details)

ENVIRONMENTAL STUDIES COURSES

101. Capstone Seminar

Interdisciplinary study of complex environmental issues. Required of all environmental studies minors. *Prerequisites: senior status and permission of instructor.* (5 units)

120. Introduction to Environmental Law and Regulation

Introduction to the U.S. legal system's approach to environmental protection. Topics include the roles of legislatures and environmental agencies at the federal, state, and local levels; the independent role of the judiciary in establishing environmental law; and specific statutes, such as the Clean Air Act. Students evaluate questions of federalism, uses of economic incentives, relationships between environmental protection and economic growth, etc. Taught by School of Law professor.

199. Independent Study

Detailed investigation, directed reading, internship, or field work on advanced environmental topics, under the close supervision of a faculty member or the program directors. *Prerequisite: permission of program directors and instructor before registration.* (units to be arranged)

RETAIL STUDIES

Dale D. Achabal, Ph.D. (*Director*)
Shelby H. McIntyre, Ph.D. (*Associate Director*)

The Retail Studies program, offered through the Retail Management Institute, provides students with a realistic perception of the retailing industry. The program is open to all University undergraduates. The majority of the courses in the curriculum for the program are required for business majors. Arts and Sciences majors can use general University requirements and electives to fulfill many of the curriculum requirements.

Students entering the Retail Studies program continue to major in their field of interest and receive their bachelor's degree in that field. Students completing the program receive a Certificate in Retail Studies.

Students acquire hands-on experience by serving a full-time, 10-week internship with a major retail organization. The internships give students an opportunity to apply classroom theories to actual situations in a work environment, enabling them to practice and refine their managerial skills.

Participants also take a two-quarter Retail Studies Seminar. The seminars cover topics such as conceptual blockbusting, negotiation, merchandise presentation, human resources, information systems, consumer behavior, and promotion and planning. With this strong business and liberal arts background, the retail management student is well prepared for the challenges of today's increasingly complex business world.

Nonbusiness majors are encouraged to apply for admission to the program during their freshman or sophomore year to allow time to integrate their course of study in retailing with the requirements in their major field. Business students who have completed the lower-division requirements can enter the program as late as their junior year. To be admitted to the Retail Studies program, students must complete an application that will be reviewed by the Retail Management Institute faculty and staff. Applications are available in the Retail Management Institute Office, 108 St. Joseph's Hall (408-554-4960).

MILITARY SCIENCE

Professor of Military Science: Lieutenant Colonel Paula M. Molnar
Assistant Professors: Captain Mark D. Daugherty,
Captain Anne R. Mackie

The University supports a battalion of Army Reserve Officer Training Corps (ROTC). The program is designed to develop men's and women's management skills and leadership abilities for successful careers in both the corporate world and the military. Instruction is conducted on and off campus.

All courses offered by the Military Science Department are fully accredited and applicable toward fulfilling academic requirements for graduation. Through

this voluntary program, the University offers all eligible students the opportunity to obtain an officer's commission in the U.S. Army Reserve, National Guard, or active Army, while earning their college degree.

ACADEMIC CURRICULUM

The Military Science core curriculum listed below consists of seven lower-division classes in the ROTC Basic Course and seven upper-division courses in the ROTC Advanced Course.

The professional military education of ROTC cadets consists of two essential components: a baccalaureate degree from Santa Clara University and at least one undergraduate course from each of five designated fields of study. Prior to commissioning, cadets must take at least one course in written communication, military history, human behavior, computer literacy, and math reasoning. ROTC cadets who have won scholarships must also take at least one class in a major Indo-European or Asian foreign language. The military history requirement may be satisfied by taking Military Science 45 or History 25 (20th-Century World Wars).

Basic Course

The Basic Course, comprising the lower-division courses listed below, is normally taken during the freshman and sophomore years. Students may also satisfy the Basic Course requirements by taking Military Science 24. There is no military obligation incurred for participation in Basic Course classes.

Advanced Course

The Advanced Course consists of the seven upper-division courses listed below. Attendance at leadership laboratories, satisfactory completion of a physical examination, and quarterly physical fitness tests are required to remain in the Advanced Course.

Students who desire to enroll in the Advanced Course must apply and be accepted. Only those students who have satisfied ROTC Basic Course requirements and the requirements of Army regulations are eligible. For details of eligibility, see the ROTC enrollment officer, Varsi Hall.

LEADERSHIP LABORATORIES

Leadership laboratories are required for all Advanced Course and ROTC scholarship cadets. Performance during lab periods is reflected in the student's course grade. Labs include activities such as rappelling, terrain navigation, patrolling, marksmanship, drill and ceremonies, and tactical field training exercises.

FINANCIAL ASSISTANCE

Scholarship Program

Army ROTC scholarships pay 80 percent of tuition, a flat-rate allowance for books and supplies, and laboratory fees in addition to an allowance of $100 per month during the school year. Two-year scholarships guaranteeing assignment to Army National Guard or Army Reserve status are also available to sophomores.

Scholarship recipients are expected to maintain acceptable standards of academic achievement and personal conduct. They must rank in the upper third of their Army ROTC class and continuously demonstrate leadership potential. The records of scholarship recipients will be reviewed each quarter by the professor of military science to determine eligibility for continued financial assistance.

Detailed information on the scholarship program may be obtained from the professor of military science.

Simultaneous Membership Program

Advanced Course cadets may elect to join Reserve or National Guard units as officer candidates. Cadets receive pay and allowances from both ROTC and their assigned unit while gaining essential military knowledge prior to their commissioning. Cadets participating in this program can earn more than $5,000 in two years. Not open to three- and/or four-year scholarship students.

EXTRACURRICULAR ACTIVITIES

Pershing Rifles Military honor society

SCU Color Guard Precision marching unit

Ranger Platoon Intensive small-unit operations emphasizing survival training and tactical skills

Airborne Training Army parachute qualification (conducted at Fort Benning, Ga.)

Air Assault Training Helicopter-related tactical operations

COMMISSIONING AS U.S. ARMY OFFICERS

Students must complete the Advanced Course to be eligible for appointment and commissioning as officers in the U.S. Army Reserve. Reserve commmissions are tendered in all branches of the Army, except the Medical, Dental, Veterinary, Judge Advocate, and Chaplain Corps. A board of officers determines the branch in which students are commissioned based on their preference, leadership potential, academic background, and the needs of the service.

A student who receives a bachelor's degree and has been designated a Distinguished Military Graduate by the president of the University and the professor of military science may, on graduation and approval of the Department of the Army, be commissioned directly in the Regular Army.

BASIC COURSES

Freshman

11. Introduction to ROTC

Presents the role of the Reserve Officer Training Corps (ROTC) in U.S. Army. Introduction to organization and career opportunities available in either the active or reserve components of the U.S. Army (2 units)

12. Survival Skills I

An introduction to civilian and military land navigation techniques combining classroom and hands-on experience. Other topics include fundamentals of first aid, basic rifle marksmanship, and leadership development. (2 units)

13. Survival Skills II

Continuation of 12. Provides classroom and hands-on experience. Topics include land navigation, leadership communications, first aid, and survival planning. (2 units)

Sophomore

21. Individual Leadership and Development

Development of a working definition of leadership and personal aspects of leadership as they relate to small groups. An overview of communication and small-group interaction. Practical exercises as vehicles for examining small-group/ leadership dynamics. (2 units)

22. Map Reading and Land Navigation

Introduction to the skills of military land navigation, including map reading, terrain analysis, azimuth plotting with known and unknown locations, and use of compass and map in orienteering. Practical exercises and orienteering games. (2 units)

23. Small-Unit Leadership

Preparation for entry into ROTC Advanced Course. Emphasis on military briefing skill, leadership, and small-unit tactics. Topics include branches of the Army, troop-leading procedures, and combat orders. Focus on development of self-confidence and the ability to handle stress. (2 units)

24. ROTC Basic Camp

Six weeks of full-time intensive training in leadership and management conducted at Fort Knox, Ky. (no expense to students). Fulfills all ROTC Basic Course requirements through training received in fundamental military skills such as land navigation, drill and ceremonies, communications, rappelling, rifle marksmanship, first aid, and physical training. Taking the course does not obligate the student to military service but provides exposure to life in the military. Outstanding students may win two-year scholarships. Pass/no pass. (4 units)

ADVANCED COURSES

Advanced Leadership and Management

131. Small-Unit Tactics

A detailed look at the use of Army personnel and equipment. Emphasis on analysis of small-unit operations and equipment. Students will apply teachings in regularly scheduled leadership laboratories and field training exercises. (3 units)

132. Small-Unit Operations

Development of the skills and principles learned in Military Science 133. Intense practical application of tactics. Students required to prepare and give oral presentations and briefings on selected military subjects. (3 units)

134. Advanced Camp Symposium

A performance-oriented study of military communications equipment and techniques, small-unit tactics, and leadership traits. Further study in selected subjects in military history also emphasized. (3 units)

135. ROTC Advanced Camp

Six weeks during the summer of full-time intensive training in leadership and management at Fort Lewis, Wash. Students thoroughly evaluated in their ability to lead a small unit and plan and conduct military operations. Attendance is normally between the junior and senior year. All expenses are paid and, additionally, students earn more than $700 during the six weeks. Those students who excel at Advanced Camp may be offered additional military training. (5 units)

Leadership and Management Seminars

143. Military Operations

Development of leadership and technical/tactical skills through performance as trainer and supervisor. Emphasis on how to prepare and conduct training and Army staff functions. (3 units)

144. Military Support Operations

Continues development of leadership and critical skills. Instruction includes ethics, military justice, the Army supply system, and other subjects to assist in the transition to the Officer Corps. (3 units)

145. Precommissioning Seminar

Continues development of leadership and critical skills. Cadets work as a battalion-level staff to plan and coordinate leadership labs and a field training exercise. (3 units)

UNIVERSITY INSTITUTES

The University offers institutes that include multidisciplinary or related courses on a theme developed by faculty members from different disciplines in the College of Arts and Sciences, the Leavey School of Business and Administration, and the School of Engineering. In addition to academic courses, institutes usually include public lectures, dramatic productions, films, and social events. The University sponsored the Institute on War and Conscience and the Institute on the Family in fall 1982 and winter 1984, respectively. The Institute on Poverty and Conscience took place in winter 1985, followed by the Institute on Technology and Society in winter 1986 and the Institute on the Bicentennial of the U.S. Con-

stitution in winter 1987. Voice of the Voiceless: An Institute on Human Rights and Social Justice was held from winter 1990 through spring 1991. An institute occasioned by the quincentennial of the arrival of Columbus in the Western Hemisphere took place in 1992.

INSTITUTE FOR PARALEGAL EDUCATION

Emalie M. Ortega, Esq. *(Director)*

The School of Law administers the Institute for Paralegal Education. The institute offers a certificate program for persons interested in careers as paralegals in the legal profession and in law-related occupations. The certificate requires 48 units of credit in paralegal education, the equivalent of 16 classes. The units are for professional growth credit, not for academic credit. The institute operates on the quarter system. The program may be completed in one year as a full-time student or during two years as a part-time student. Although day and evening courses are offered, the number of day classes is limited. Students may take any class on an open-enrollment basis; however, entering certificate program students must meet certain general education requirements and should contact the director of the program for an interview prior to admission.

Students are required to take Introduction to Law, Principles of Legal Practice, Summary of American Law, and Legal Research and Writing. Thereafter, they may generalize or concentrate in a major field of law. A component of specific courses provides training for paralegals interested in public sector work. A brief internship arranged by the director is a recommended part of the program. Limited transfer credit may be available for qualified students. The institute is approved for veterans' benefits, Pell grants, and certain government loans. The institute is a member of the American Association for Paralegal Education and is in compliance with program guidelines set forth by the American Bar Association. The School of Law is accredited by the ABA; the institute does not pursue individual ABA approval.

For information contact the Institute for Paralegal Education, B of A Building, Suite 507, 900 Lafayette Street, Santa Clara, CA 95053 (408-554-4535; fax, 408-554-5188).

YOUNG SCHOLARS PROGRAM

Terry L. Beers, Ph.D. *(Director)*

The Young Scholars Program offers highly motivated high school juniors and seniors an intensive and challenging experience of University life. The program is offered during the University's regular summer session. Students enroll in a special seminar and a lower-division course from the University's curriculum, and they participate in extracurricular workshops that address the concerns of college-bound students.

Applications open on Feb. 15, with a May 1 deadline. Admission is on a com-

petitive basis, with priority given to students who have been admitted to the University for the following fall quarter. For information and application materials, contact Professor Terry Beers, Young Scholars Program Director, College of Arts and Sciences (408-554-4455).

AEROSPACE STUDIES

Santa Clara University has entered into an agreement with San Jose State University that permits Santa Clara students to enroll in a program leading to a commission as a second lieutenant in the U.S. Air Force. Academic instruction includes Air Force organization, history, officer skills, leadership and management, and national security policy and issues. For those who qualify, Air Force ROTC scholarships, which pay for tuition, books and supplies, laboratory fees, and an allowance of $100 per month during the school year, are also available.

For detailed information on enrollment and scholarships, contact the Department of Aerospace Studies at San Jose State University (408-924-2960).

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Academic Information

GENERAL GRADUATION REQUIREMENTS

Candidates for the degree of Bachelor of Arts (B.A.) or Bachelor of Science (B.S.) in the College of Arts and Sciences and the Bachelor of Science in Commerce (BSC) in the Leavey School of Business and Administration must

1. complete a minimum of 175 quarter units (engineering physics majors complete a minimum of 197 quarter units);
2. complete a minimum of 12 upper-division courses, totaling at least 60 quarter units, after completing 88 quarter units;
3. attain an average of C (2.0) in both their major and minor subjects and their total course load;
4. meet the residency requirement during the senior year of a minimum of three quarters and 45 units at the Santa Clara campus;
5. fulfill the University Curriculum requirements; and
6. fulfill the minimum course requirements of both their college or school and their major departments.

Candidates for the degree of Bachelor of Science (B.S.) in the School of Engineering must

1. complete a minimum of 198 quarter units;
2. attain an average of C (2.0) in both their major and minor subjects and their total course load;
3. meet the residency requirement during the senior year of a minimum of three quarters and 45 units at the Santa Clara campus;
4. fulfill the University Curriculum requirements; and
5. fulfill the minimum course requirements of both their school and their major departments.

Specific course requirements to meet each of these goals are outlined in the sections for each College or School.

Honors at Graduation

The candidate for an undergraduate degree with a grade point average between 3.45 and 3.69 graduates cum laude; one with a grade point average between 3.70 and 3.89 graduates magna cum laude; one with a grade point average of 3.90 or higher graduates summa cum laude.

Honors are based on all graded undergraduate courses attempted at Santa

Clara University and elsewhere. Transfer students must complete at least two full years or 90 units at the University to be eligible for honors, and no honors will be awarded above those merited by the student's record at Santa Clara. An indication of honors at graduation contained in the commencement program is unofficial. The final determination will be made after a review of all completed undergraduate courses.

Second Bachelor's Degree

A student may earn a second bachelor's degree. For students whose first bachelor's degree is from Santa Clara, the conditions are (1) an academic record showing a strong probability of success in this undertaking; (2) a projected program of study that will amass at least 45 Santa Clara units beyond the first bachelor's degree; (3) following the requirements in effect at the original matriculation date, provided the student is pursuing the second bachelor's degree concurrently or without interruption; and (4) written approval of the appropriate dean submitted to the Student Records Office. Students returning after an absence of fewer than five years are subject to the above conditions, with the exception that they follow the requirements in effect upon re-entry.

If more than five years have passed since the granting of the first bachelor's degree, a formal application for admission must be filed with the Office of Undergraduate Admissions. Candidates are subject to the curriculum requirements contained in the *Undergraduate Bulletin* in effect at the time of re-entry.

All candidates whose first degree is from an institution other than Santa Clara must file a formal application for admission with the Office of Undergraduate Admissions and will be considered on a space-available basis. Candidates are subject to the curriculum requirements contained in the *Undergraduate Bulletin* in effect at the time of entry.

Normally, financial aid other than student loans is not available to students seeking a second bachelor's degree.

Second Major or Academic Minor

A student may declare a second major or an academic minor by obtaining the approval of the appropriate chairs and dean(s). The conditions governing the declaration of a second major or an academic minor and the required form may be obtained from the Student Records Office. Students are subject to the *Undergraduate Bulletin* requirements in effect at the time of declaration.

REGISTRATION

Registration materials must be obtained at the time and place announced by the University. All forms must be completed and returned as instructed. Financial arrangements for the payment of tuition and fees must be made prior to registration, or as otherwise announced by the University.

The University reserves the right to deny registration to any student for reasonable cause.

Student Classification

Students are classified by the number of quarter units they have completed with passing grades. Lower-division students are considered freshmen if they have completed fewer than 44 units, and sophomores when they have completed 44 but fewer than 88 units. Upper-division students are considered juniors when they have completed at least 88 but fewer than 131 units, and seniors when they have completed at least 131 units.

For academic purposes, students taking fewer than 12 units are considered part-time students. For tuition purposes, however, a part-time student is defined as a lower-division student taking fewer than three (3) term courses or an upper-division student taking fewer than two (2) term courses regardless of the unit value of the courses. Admission to the University as a part-time student requires approval by the dean of the College or School the student is currently attending or to which the student has applied. Six units is the minimum number of units for consideration of at least half-time enrollment. Generally, students enrolled less than full-time, but at least half-time, may be eligible only for Stafford Loans.

Course Numbering System

Lower-division courses are numbered 1–99; upper-division courses, 100–199. Most undergraduate courses in the College of Arts and Sciences and the Leavey School of Business and Administration carry 4 or 5 units of academic credit. In the School of Engineering, course values range from 3 to 5 units each.

ACADEMIC ADVISING

Each incoming student is assigned to a specific faculty member who serves as the student's academic adviser. Usually the assignment is made according to the student's declared major or according to a general academic interest indicated by the student. The student should declare a major by the end of the sophomore year and may also, with the permission of the appropriate dean, switch advisers if personal or academic needs warrant such a change.

Academic advising is required of all freshmen, sophomores, and juniors during the published spring advising period in May. Seniors are required to seek an appointment with their adviser in the fall to review their progress toward graduation. Students are encouraged to meet with their adviser each quarter to review academic progress. Procedures for setting these meetings may vary among schools or colleges. Students should check with their assigned adviser or the dean's office for more complete information.

Pre-Medical

Admission to medical school is neither dependent on any particular undergraduate concentration nor guaranteed by graduation from Santa Clara. Several departments offer programs that satisfy the requirements prescribed by the Council of Education of the American Medical Association. Although the curriculum may be arranged in such a way that the student may comply with the requirements

for entrance to medical schools in three years, medical schools generally prefer that students spend four years in preparation and include such cultural courses in their programs as will better fit them for the practice of medicine. The pre-medical advisers, in conjunction with the students' own academic advisers, will assist them in preparing their programs in the major of their choice. For further information about undergraduate pre-medical preparation at Santa Clara, contact the Department of Biology (408-554-4496) or Chemistry (408-554-4799). Prospective applicants for admission to medical schools are urged to study the *Medical School Admission Requirements of U.S.A. and Canada,* which is published each year and is available from the Association of American Medical Colleges, One DuPont Circle N.W., Washington, D.C. 20036.

Pre-Dental

Several departments offer pre-dental programs meeting all the requirements for entrance into dental schools. The pre-dental advisers, in conjunction with the students' own academic advisers, will assist them in preparing their own programs in the major of their choice. For further information about undergraduate pre-dental preparation at Santa Clara, contact the Department of Biology (408-554-4496) or Chemistry (408-554-4799). *Admission Requirements of U.S. and Canadian Dental Schools* is published each year and is available from the American Association of Dental Schools, 1625 Massachusetts Ave. N.W., Washington, D.C. 20036.

Pre-MBA

The College of Arts and Sciences offers a pre-MBA program for any of its departmental majors. In addition to the departmental major requirements, the pre-MBA student should take the following courses as college requirements or as electives:

1. Economics 1 and 2 (Principles of Economics I, II)
2. Mathematics 11 (Calculus and Analytic Geometry I)
3. Two of the following:
   a. Mathematics 12 (Calculus and Analytic Geometry II)
   b. An introductory computer course (Math 10, DISC 17, or COEN 4)
   c. Management 11 (Business and Society)
   d. Accounting 1 and 2 (Fundamentals of Accounting I, II)

Pre-Law

There is no particular major or pre-law program required to qualify for law school. Admissions officers in the best law schools recommend undergraduate preparation in a major that requires discipline, clarity of thought, and precision in written and oral work. In addition to the College and major requirements, elective courses in English, history, philosophy, speech, the social sciences, and the fundamentals of accounting provide valuable training for students intending to pursue a career in law. Early in their undergraduate careers, these students should

consult their advisers, or one of the specially designated pre-law advisers, to formulate a program designed for their specific needs and career goals.

Pre-Teaching

Liberal studies is the academic major for undergraduates interested in a career in elementary school teaching. The program, approved by the California State Commission on Teacher Credentialing, encompasses four broad areas: (1) English and communication; (2) mathematics and natural sciences; (3) social sciences; and (4) humanities and fine arts. Students who would like to teach at the elementary level and do not complete this major must take the state subject-area examination. For further information, contact Professor Patricia Bendigkeit, coordinator of liberal studies, Department of Communication.

Students interested in becoming secondary school teachers must take either the state examination in the subject they intend to teach or complete an approved Subject-Matter Preparation Program that exempts them from the examination. Approved programs are available in ten areas: biology, chemistry, combined sciences, English, history, physics, political science, Spanish, French, and German. Students should contact the department adviser in these subject areas for information on the single-subject subject-matter programs.

Students may also consult the director of the Teacher Education program for advice on careers in teaching. Refer to the Division of Counseling Psychology and Education section of this bulletin for further information on teacher education at Santa Clara.

STUDENT RECORDS

University policy relating to student records complies with the Family Educational Rights and Privacy Act of 1974 (Buckley Amendment). Accordingly, the University may release directory information to any person on request, unless a student requests in writing that directory information be kept confidential. A student's directory information is designated as follows:

1. Name
2. Gender
3. Address (campus, local and/or permanent)
4. Telephone number
5. Date and place of birth
6. Major field of study, classification, dates of attendance, degrees, and honors received
7. Most recent previous educational institution attended
8. Past and present participation in officially recognized activities including intercollegiate athletics
9. Name, weight, and height of participants on intercollegiate athletic teams

During the registration period and throughout the academic year, students may request in writing, through the Student Records Office, that directory information

be kept confidential. Once filed, the request remains in effect only for the remainder of that academic year.

Certain records are excluded by law from inspection, specifically those created or maintained by a physician, psychiatrist, or psychologist in connection with the treatment or counseling of a student. Parents' financial information, including statements submitted with scholarship applications, is also excluded by law from inspection. Third parties may not have access to educational records or other information pertaining to students without the written consent of the particular student about whom the information is sought.

Students may inspect their records at the following offices:

1. Official academic records, including application forms, admission transcripts, letters of acceptance, and a student's permanent academic record are on file and maintained in the Student Records Office.
2. Working academic files are also maintained by the deans in their respective offices.
3. Records related to a student's nonacademic activities are maintained in the Office of the Vice President for Student Development.
4. Records relating to a student's financial status with the University are maintained in the various Student Financial Services offices.

Students may direct complaints regarding academic records to the dean of the College or School in which they are enrolled, to the director of Student Records and Financial Services, or to the University registrar. Students having questions regarding the policy on the privacy of records should contact the Student Records Office (Walsh Administration Building).

HONOR SOCIETIES

Santa Clara University is proud to host 17 prestigious national honor societies in the liberal arts, sciences, business administration, and engineering. These societies reflect a long tradition of academic excellence, tracing their origins back at least 50 years. Some date from the 19th century and one dates from the 18th.

Alpha Sigma Nu

Alpha Sigma Nu, the national Jesuit honor society, was founded at Marquette University in 1915. The Santa Clara chapter was installed in 1942, and there are chapters at 28 universities and colleges across the country. Alpha Sigma Nu upholds the Jesuit values of academic excellence and service to the University and the community. Each year new members are selected for their commitment to excellence in scholarship and service.

Beta Gamma Sigma

Beta Gamma Sigma is the national honor society for students of business. It holds a position analogous to that of Phi Beta Kappa in the arts and Sigma Xi in the sciences. Election to membership is the highest scholastic honor that a stu-

dent of business can achieve and is limited to outstanding men and women students who give promise of success in the field of business and who rank in the upper 5 percent of the junior class and the upper 10 percent of the senior class.

Eta Sigma Phi

Eta Sigma Phi, the national classics honorary society, was founded at the University of Chicago in 1914 and became a national organization in 1924. Its primary purposes are to further the spirit of cooperation and good will among members of the classics profession, to stimulate interest in the study of the classics, and to increase knowledge of the art and literature of ancient Greece and Rome. The Epsilon Psi chapter of Eta Sigma Phi was founded at Santa Clara University in 1987. To be eligible for nomination to membership, a student must have taken at least two quarters of Greek or Latin or at least three quarters of classics courses and maintain a minimum 3.0 grade point average.

Phi Alpha Theta

Phi Alpha Theta, the international honor society in history, was founded in 1921 at the University of Arkansas. There are now more than 475 chapters in 49 states, Puerto Rico, Canada, and the Philippines. The Lamda Upsilon chapter, established at Santa Clara University in 1966, is active in student and educational programs. Members are selected on the basis of excellence in the study and writing of history.

Phi Beta Kappa

Phi Beta Kappa, the oldest national honor society, was founded in 1776 in Williamsburg, Va., by students at the College of William and Mary. Its purpose is to celebrate excellence in all scholarly endeavors and to encourage educational breadth, including languages, mathematics, the sciences, and the humanities. There are now more than 230 chapters at universities throughout the country. The Pi chapter at Santa Clara University was installed in 1977. Installation of a chapter indicates that the United Chapters of Phi Beta Kappa have found a university's curricula sufficient in breadth and scholarly quality to warrant being honored by the society. Students are selected for membership on the basis of academic excellence, intensive study in a second language and college mathematics, and breadth of course work.

Phi Sigma Iota

Phi Sigma Iota, the international foreign language honor society, was founded in 1922 at Allegheny College. The Beta Delta chapter was installed at Santa Clara University in 1982. The society recognizes remarkable ability and achievement in languages, literatures, and linguistics. It stimulates advanced work in these fields, fosters intercultural understanding, and promotes a spirit of amity between our own people and other peoples of the world. Juniors and seniors with at least four advanced-content courses completed in a qualifying language, a grade point

average of 3.25 in that language, and a cumulative average of 3.0 may be eligible for membership.

Phi Sigma Tau

Phi Sigma Tau was founded at Muhlenberg College in 1930 as Alpha Kappa Alpha. In 1955, it was incorporated as Phi Sigma Tau, a national honor society in philosophy. Its essential purpose is to promote ties between philosophy departments in accredited institutions and students in philosophy nationally. Santa Clara University received its charter in 1986. To be eligible for membership, students must have completed five quarters of college work, rank in the upper one-third of their class, and have completed at least three courses in philosophy with a grade point average of 3.0 or higher.

Pi Mu Epsilon

Pi Mu Epsilon, the national honor society in mathematics, was incorporated in 1914 at Syracuse University to promote scholarly activity among college students. The California Eta chapter was founded in 1967 at Santa Clara University. Membership requirements include an overall grade point average of 3.0 and the completion of two years of college mathematics, including calculus, with a B average.

Pi Sigma Alpha

Pi Sigma Alpha, the national political science honor society, was founded at the University of Texas in 1920. There are approximately 400 chapters and more than 100,000 members nationally. In order to qualify for membership, graduating seniors must have a minimum 3.5 GPA in political science and an overall 3.0 GPA; juniors need a 3.7 GPA in political science and an overall 3.0 GPA.

Pi Tau Sigma

Pi Tau Sigma, the mechanical engineering honorary society, was founded in 1915 at the University of Illinois. There are presently 150 chapters and 90,000 members nationwide. The Santa Clara Alpha Epsilon chapter was granted its charter in 1991. Its objectives are to foster high ideals in the engineering profession, stimulate and support departmental activities, promote professional welfare, and develop leadership and citizenship. Members are selected from the top fourth of the junior class and top third of the senior class in the Mechanical Engineering Department.

Psi Chi

Psi Chi, the national honor society in psychology, was founded in 1929 for the purpose of encouraging, stimulating, and advancing the science of psychology. Presently, there are more than 200,000 members affiliated with more than 700 chapters on college campuses. The Santa Clara chapter was established in 1991.

To be eligible for membership, students must have completed 12 or more units in psychology with a grade point average of 3.0, declared a psychology major or minor, and rank in the upper third of their class.

Sigma Pi Sigma

Sigma Pi Sigma, the national physics honor society, was founded in 1921 at Davidson College, North Carolina. The society currently has more than 275 chapters and 40,000 members. The Santa Clara chapter was founded in 1969. Sigma Pi Sigma encourages a greater understanding and interest in the advanced study of physics, promotes research, and fosters the spirit of scientific inquiry. Members are selected from the upper quarter of their class and must also have a 3.2 grade point average in physics and mathematics.

Sigma Tau Delta

Sigma Tau Delta, the national English honor society, was founded in 1924 at Dakota Wesleyan University. The Santa Clara chapter, Phi Phi, was established in 1987. Sigma Tau Delta recognizes scholarly achievement in all aspects of English language and literature, including creative and critical writing. Members must be in the upper 35 percent of their class and must also have a B average in English.

Sigma Xi

Sigma Xi was founded in 1886 by a group of scientists at Cornell University to encourage original investigation in pure and applied science. The Santa Clara chapter was established in 1967. Students who have demonstrated an aptitude for original scientific research are eligible for associate membership. The requirements for full membership include noteworthy achievements in research as demonstrated by a doctoral dissertation, publications, or patents.

Tau Beta Pi

Tau Beta Pi, a national honor society for technical students, was founded in 1885 at Lehigh University. There are now more than 144 chapters with a total membership exceeding 175,000. The Santa Clara chapter was established in 1956. This organization recognizes superior scholarship and exemplary character. Members are selected from the upper fifth of the graduating class in engineering and must demonstrate personal integrity, breadth, adaptability, and unselfish activity.

Theta Alpha Kappa

Theta Alpha Kappa is the national theology and religious studies honor society for both professors and students. The society was founded in 1976 at Manhattan College. The Santa Clara chapter, Alpha Phi, was granted a charter in 1981. Its main purpose is to further the study of theology and religious studies by

fostering excellence in these studies. Religious studies majors and minors with a grade point average of 3.5 and a cumulative index of 3.0 are eligible for admission to the society.

Upsilon Pi Epsilon

Upsilon Pi Epsilon is the honor society for the computing sciences. The society was founded at Texas A&M University in 1967 to promote high scholarship and original investigation in the computing sciences. The Santa Clara Lambda chapter was established in 1990. Members must be computing majors; have been in residence for at least one quarter; completed 96 units, at least 20 of which must be from computing courses; and earned a 3.3 GPA in computing courses and a cumulative grade point average of 3.35.

SCHOLARSHIPS

The University awards annual scholarships to students based on financial need and academic promise or special talents. For more information, refer to the Financial Information section of this bulletin and to the information bulletin published by Student Records and Financial Services.

UNIVERSITY AWARDS

Valedictorian Established by the University in 1980, this honor is conferred annually on a graduating senior selected for outstanding academic achievement and University service as determined by the academic vice president and the faculty of the University.

Nobili Medal Established in 1876 by Joseph A. Donohoe, in honor of John Nobili, S.J., founder of the University, this award is given to the male graduate judged outstanding in academic performance, personal character, school activities, and constructive contribution to the University by the faculty and the academic vice president.

Saint Clare Medal Established by the University in 1968 in honor of Saint Clare of Assisi, this award is given to the female graduate judged outstanding in academic performance, personal character, school activities, and constructive contribution to the University by the faculty and the academic vice president.

SPECIAL AWARDS

Community Service

Richard J. Riordan Awards Established in 1984 by Richard J. Riordan, these awards are given annually to four students judged outstanding in community service.

Forensics

Ryland Prize Established in 1897 by the Hon. Caius T. Ryland, this award (formerly Ryland-Owl Prize) is given to the winner of the annual Ryland debate. Focusing on current social and political issues, this public debate is held each spring and judged by a faculty committee.

Journalism

Handlery Prize Established in 1947 by Mrs. Rose Handlery in memory of her son Raymond of the class of 1934, this prize is awarded each year to the graduating senior who has contributed most to the success of student publications at the University.

Shipsey Journalism Prize Established in 1984 by Alfred Orr Kelly in honor of Edward Shipsey, S.J., this prize is awarded to an outstanding junior who has made a commitment to a career in journalism.

Performing Arts

Charles Lampkin Award This annual award, established in 1989 in honor of Charles Lampkin, the late actor and University artist-in-residence, is given to the junior or senior black student who has demonstrated excellence and commitment to performance in theatre, music, dance, or television.

LEAVEY SCHOOL OF BUSINESS ANDADMINISTRATION AWARDS

Business Administration Prize Established in 1942, this prize is given annually by the Business Administration Association to the student who has made the greatest contribution to the Leavey School of Business and Administration.

Isabel Jones Prize Established by Dr. Eliot Jones in 1956 in memory of his wife, Isabel, this award is given to the senior in the Leavey School of Business and Administration judged most outstanding in scholarship by the business school faculty.

Charles J. Dirksen Prize Established in 1965 by Dr. Eliot Jones in honor of Charles J. Dirksen, dean emeritus of the business school, this prize is awarded to the junior in the Leavey School of Business and Administration judged outstanding in scholarship by the faculty.

Professor O. Robert Anderson Award Established in 1973, this award is given in memory of Prof. O. Robert Anderson who taught accounting at the University. It is awarded annually to the accounting major judged outstanding in scholarship by the faculty of the department.

Albert F. Bruno Award Established in 1982 in memory of Albert F. Bruno by Albert V. Bruno and family, this award is conferred annually to the outstanding

marketing major on demonstration of scholarship, leadership, personal character, and career potential.

Financial Executives Award Established at Santa Clara in 1980, this award is given annually by the Financial Executives Institute to the senior, junior, and sophomore finance majors judged outstanding in scholarship and executive potential by the finance faculty and members of the institute.

Outstanding Accounting Student Award Established in 1973, this award is given annually by the San Jose Chapter of the California Society of Certified Public Accountants to the senior accounting major judged outstanding in scholarship and professional career potential by a committee of the chapter.

Wall Street Journal Student Achievement Award Established at the University by Dow Jones Corp. in 1960, this award is given to the senior finance major with the highest scholastic average.

SCHOOL OF ENGINEERING AWARDS

William J. and Marijane E. Adams Jr. Awards Established in 1990 by William J. and Marijane E. Adams Jr., one award is conferred annually to an outstanding mechanical engineering undergraduate student with financial need; and one award provides a stipend for an outstanding graduating senior in mechanical engineering to continue to graduate school at Santa Clara.

Edmund C. Flynn Memorial Awards Established in 1981 by Mrs. Edmund C. Flynn in memory of her husband, these awards are given to the graduating civil engineering student presenting the best thesis and to the two junior civil engineering students with the highest scholastic averages.

Regan Memorial Award Established in 1977 in memory of Patrick W. Regan of the class of 1947, this award is given to the outstanding juniors in civil engineering as determined by the faculty of the department.

COLLEGE OF ARTS AND SCIENCES AWARDS

Chemistry

Professor Joseph F. Deck Award Established in 1973, this award is given by the Chemistry Department faculty to the outstanding student majoring in chemistry who has excelled in studies and undergraduate research, extracurricular activities, leadership, and generous tutoring of fellow students, while maintaining a B average.

Communication

Communication Department Prize Established in 1985 by alumni and friends, this award is given by the Communication Department faculty to the graduating senior who best meets the goals of the department.

Justin T. McCarthy Award Established in 1976 in memory of Justin T. McCarthy, this award is given to the senior student who has excelled in oratory.

English

McCann Short Story Prize Established in 1894 in honor of Daniel M. McCann, B.S. 1884, this award is given by the English Department to the author of the best short story as determined by an annual competition.

Shipsey Poetry Prize Established in 1954 by Richard W. Schmidt in honor of the late Edward Shipsey, S.J., this prize recognizes the outstanding contribution in the art of poetry as determined by an annual competition.

History

The Redwood Prize An annual prize established in 1908 by the executive committee of the *The Redwood,* this award is given to the student who writes the best essay on a historical subject as determined by the History Department faculty.

Italian

San Jose Civic Club Prize Established in 1956, this award is given by the Italian faculty to the student most diligent in the study of Italian.

Language

Richard F. Rebello Phi Sigma Iota Award Established in 1986 by the family of the late Richard Rebello, longtime University staff member, these awards are given by the Modern Languages Department to junior or senior language majors for outstanding accomplishments in the study of a foreign language and culture.

Mathematics

Freshman Mathematics Prize Established in 1958, this annual award of books is given by the faculty of the Mathematics Department to the freshman student who demonstrates excellence in mathematical study and achievement, determined by a competitive examination each spring.

George W. Evans Memorial Prizes Established in 1972 by the family and friends of the late George W. Evans II, professor of mathematics at the University, these awards are given to the male and female students placing highest in the William Lowell Putnam Mathematical Competition. A third award is given to the student judged most outstanding in mathematical writing and research by a panel of mathematics consultants.

Music

American Choral Directors Association National Choral Student Award This award is given to a student who has been involved in continued participation in choral ensembles, has provided service to the ensemble and conductor, has demonstrated a high degree of choral proficiency and music literacy, and has contributed to the advancement of choral singing at the University.

Department of Music Certificate for Distinguished Musical Performance Established in 1980 by the faculty of the Music Department, the performer's certificate is awarded to a student demonstrating exceptional accomplishment in music and excellence in musicality and technical proficiency.

Arrigo and Catherine Descalzi Prize Established in 1990 in honor of Arrigo and Catherine Descalzi, this award is presented to the senior music student who, in the judgment of the Music Department faculty, best demonstrates technical and artistic growth and dedication to the art of music.

Natural Science

Orella Prize Established in 1915 by Dr. Firim R. Orella, B.S. 1889, and funded in 1945 by his wife, Albertine S. Orella, this prize is awarded to the senior science student who attains the highest average in scientific subjects.

Philosophy

Class of 1939 Award in Philosophy Established in 1983 by the Class of 1939, this award is given by the Philosophy Department faculty to the junior student who has achieved academic excellence in the study of philosophy in the Jesuit tradition.

Sourisseau Prize Established in 1956 by Miss Eva Sourisseau in honor of her parents and family, this award is given by the Philosophy Department faculty to the senior student demonstrating outstanding achievement in the study of philosophy.

Physics

IBM Corporation Prize Established in 1979 by IBM, this prize is awarded to the most outstanding student in Physics 4, 5, and 6 (Physics for Scientists and Engineers I, II, and III) as selected by the faculty who teach the sequence.

Political Science

Michael Shallo Prize Established by the University in 1955 in honor of Michael Shallo, S.J., this award is given by the Political Science Department faculty to the student judged most proficient in political science.

Psychology

Wilhelm Wundt Award Established in 1988, this annual award is given by the Psychology Department faculty to the senior student who has excelled in scholarship, research, and service to the department.

Religious Studies

Religious Studies Prize Established in 1950 by the president of the University, this prize is given each year by the Religious Studies Department faculty to the student most proficient in religious studies.

Sociology and Anthropology

Witold Krassowski Sociology/Anthropology Awards Established in 1979 by the department, alumni, and friends in honor of Prof. Witold Krassowski, the first sociologist at Santa Clara, these prizes are awarded by the faculty to the students in the department demonstrating exemplary research in sociology and anthropology.

Theatre and Dance

William H. Leahy Prize Established in 1925 in honor of William H. Leahy by his wife and his brother James, this prize is awarded to the graduating senior who has made the greatest contribution to dramatic art at Santa Clara as determined by the members of the Theatre and Dance Department.

DEPARTMENT OF MILITARY SCIENCE AWARDS

Armed Forces Communications and Electronics Award Established by the Department of the Army at Santa Clara in 1973, this annual award is given by the Military Science Department faculty to the cadet in a communications or electronics field who excels in academic achievement, demonstrated leadership potential, and meritorious contribution to the ROTC program.

Association of the U.S. Army ROTC Medal Established at Santa Clara in 1956 by the Department of the Army, this award is given by the Military Science Department faculty to the junior cadet judged most outstanding in meritorious academic attainment, exemplary conduct, efficiency, and fidelity.

George C. Marshall ROTC Award Established at Santa Clara in 1977 by the Department of the Army, this award is given by the Military Science Department faculty to the cadet judged most outstanding in military studies and leadership.

Medals of Santa Barbara Established by the University in 1953, these four gold medals are awarded annually by the president of the University to the outstanding cadet in each of the four years of military training for meritorious academic achievement, exemplary conduct, efficiency, and fidelity, as determined by the Military Science Department faculty.

Superior Cadet Award Established by the Department of the Army at Santa Clara in 1958, these ribbons are given by the Military Science Department faculty to the cadet in each of the four years of training who consistently demonstrates potential qualities of an officer, outstanding performance of duty, and overall proficiency.

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Academic Regulations

GRADING SYSTEM

Grades reflecting the quality of a student's work are reported as follows: A (excellent), B (good), C (adequate), D (barely passing), F (not passing), P (pass), NP (no pass), and I (incomplete).

The grades A, B, C, and D may be modified by (+) or (-) suffixes, except that the grade of A may not be modified by a (+) suffix. Grade point values per unit are assigned as follows: A = 4.0; A- = 3.7; B+ = 3.3; B = 3.0; B- = 2.7; C+ = 2.3; C = 2.0; C- = 1.7; D+ = 1.3; D = 1.0; D- = 0.7; and F, I (incomplete), P (pass), NP (no pass), AUD (audit), N (continuing work), NR (no grade reported by instructor—this notation is assigned by the Student Records Office)—and W (withdrawn) = 0. Unit credit, but not grade point credit, is awarded when the grade of P is assigned.

Students must achieve a grade point average of 2.0 in their declared major(s) and academic minor, as well as a cumulative grade point average of 2.0 or higher in all courses in order to be eligible for graduation. A grade point average is determined by multiplying each grade point value by the number of quarter units assigned to the course, adding these grade point units from all courses taken, and dividing this sum by the total number of quarter units for which letter grades were reported.

Student grade reports, issued at the end of each quarter, indicate the grade point average earned during the quarter just completed as well as the cumulative grade point average the student has earned to this point.

Pass/No Pass Option

A junior or senior may choose to take an *elective* course on a pass/no pass (P/NP) basis. (An elective course is one other than a University, College, or department requirement.) The pass/no pass choice can be made up to the final day of adding classes.

A grade of P signifies that the quality of work done is equivalent to a letter grade of C or higher, while a grade of NP denotes work at the level of C-, D, or F. Courses taken under the pass/no pass option will fulfill graduation unit requirements but are not used in determining grade point averages.

Students may elect only one course per quarter on a pass/no pass basis. A maximum of six such courses can be applied to graduation requirements.

Incompletes

A student may receive an incomplete grade (I) in a course if, because of extraordinary circumstances beyond the student's control, some essential portion of the assigned work has not been completed before the final examination. The unfinished work must be completed and given to the course instructor within three weeks of the beginning of classes in the next scheduled term (not the student's next term of enrollment), excluding summer session, unless extraordinary circumstances require an extension. All extensions of time must be in writing and approved by the registrar; they should not exceed a period longer than two academic quarters after the Incomplete was assigned, excluding summer session. Approval for an extension must be obtained and forwarded to the Student Records Office by the instructor within the three-week period mentioned above.

Change of Grade

Only the instructor in charge of a course may assign grades. All grades, except incompletes, become final when they have been assigned and reported to the Student Records Office. An instructor may report to the Student Records Office a correction of a final grade only if a clerical or procedural error was made in assigning, transmitting, or recording the original grade. A grade may not be changed as a result of re-evaluation, re-examination, or the submission of additional work after the term ends. No grade may be changed after one year.

Unit Overload Restrictions

Students' quarterly course load may not exceed 19 units unless their cumulative grade point average at Santa Clara is at least 3.3 or they obtain written permission from the dean. Students who do not meet the above criteria and register for more than 19 units without prior written approval will not receive credit for the additional courses. One 2-unit course or two 1-unit courses are not counted as overload units. All students may add overload units only during the add period, including those with a 3.3 grade point average.

COURSE RESTRICTIONS

Lower-division students may not enroll in upper-division courses without the written approval of their dean. Failure to obtain this written approval may result in administrative withdrawal or loss of academic credit for the upper-division course or courses taken.

CHALLENGING COURSES

Students may challenge certain courses to satisfy specific subject requirements for graduation. However, units earned in this manner may neither be counted toward the total needed for graduation, nor used to satisfy the residency requirements.

To challenge a course, the student takes a special three- to four-hour exami-

nation on the material covered by that course and meets any additional requirements. All courses listed in the *Undergraduate Bulletin* may be challenged except those involving laboratory, studio, or specialized group work and those whose descriptions in the catalog are followed by the letters NCX.

In order to be eligible to challenge a course, students must (1) have completed at least one term at Santa Clara; (2) have a cumulative grade point average of at least 2.2 and a grade point average of 2.5 or higher in their major; and (3) have received the permission of the instructor and academic dean of the School or College in which the course is offered. The petition form is available from the Student Records Office. Only currently enrolled students are eligible to challenge a course.

Challenge examinations are arranged by the instructor. The petition form must be submitted to the Student Records Office at least two weeks prior to the examination. A $50 fee is charged for each course challenged.

Challenged courses may not be graded P/NP, and no more than one course may be challenged each term.

REPETITION OF COURSES

With the written approval of the academic dean of their School or College, students may repeat a course in which they receive a grade of D. All courses, whether repeated or not, are included in the calculation of grade point averages. However, units needed for graduation will be awarded only once for each course passed.

A few courses are designated as repeatable, and students will receive a grade and units toward graduation for each successful completion.

AUDITING COURSES

Students may audit one course in addition to their regular study load. Permission to audit a course will be given only at the end of the late registration period, and then only if space is available in the class. Although no credit is assigned for an audited course, the audit can be used as preparation for a challenge of that course during the following term. The successful completion of an audit will be indicated on a student's transcript by the notation AUD. A maximum of three courses may be audited. For those students not enrolled full time, a $250 course audit fee is charged.

INDEPENDENT STUDY

Under certain conditions, upper-division students may pursue independent study through directed reading, directed research, practica, or internships. To qualify, a student must have demonstrated a sufficient knowledge of the academic discipline involved to make independent study both possible and beneficial. No more than four independent study courses can be used to satisfy graduation requirements, and no more than one independent study course may be taken per term.

Students wishing to enroll in independent study courses must submit the Petition for Independent Study form, together with the required materials and approvals, to their academic dean at least one week prior to the date of registration. The forms are available from the offices of the academic deans and the Student Records Office.

REGISTRATION CHANGE

During the first week of each term, students are permitted to alter their original registration schedule by following the regular procedures established for this purpose by the Student Records Office. During the second, third, and fourth weeks of classes, a student may withdraw from a class without a W notation appearing on the academic record. From the fifth to the end of the ninth week of classes, a student is permitted to withdraw from a class, but a W notation will appear on the academic record. No withdrawal is permitted during the final week of classes. The form required to effect a formal withdrawal from a class is available from the Student Records Office. Students may receive a grade of F in the class if they fail to file this form.

TRANSFER WITHIN THE UNIVERSITY

Students wishing to transfer from one School or College to another within the University must file a petition for admission with the dean of the School or College they wish to enter. The action taken as a result of the petition will depend on the applicant's past academic record and on the availability of space within that School or College. No student whose grade point average is lower than 2.0 will be considered for transfer.

CONCURRENT ENROLLMENT

Permission for concurrent enrollment at another academic institution will be granted by the academic dean only for extraordinary reasons.

UNITS TAKEN AT OTHER INSTITUTIONS

Students may earn up to 10 quarter units during the summer at other regionally accredited colleges or universities and transfer those units to Santa Clara. However, these units may not be counted as fulfilling a University or College of Arts and Sciences core requirement or a requirement of the student's major. Exceptions require *prior* approval from the department chair of the student's major, the head of academic advising, and the chair of the department offering the equivalent SCU course. This policy does not apply to units earned prior to becoming a Santa Clara student or to units earned in Santa Clara University-approved Studies Abroad programs.

ATTENDANCE

Students are required to attend all classes. Penalties for absences are left to the discretion of individual instructors. Students are held accountable for all assignments in each course, whether or not the assignments were announced during an absence.

WRITTEN EXAMINATIONS

Written examinations are usually given at the middle and end of each term. Grade reports are issued only at the end of the term. Midterm letter grades in all courses are calculated and made available by the instructor to all freshmen as well as to those sophomores, juniors, and seniors whose work is deficient.

ACADEMIC INTEGRITY

The University is committed to academic excellence and integrity. Students are expected to do their own work and to cite any sources that they use. A student who is guilty of dishonest acts in an examination, paper, or other required work for a course, or who assists others in such acts, may receive a grade of F for the course. In addition, a student guilty of dishonest acts may be immediately dismissed from the University.

A student who violates copyright laws, including those covering the copying of software programs, or who knowingly alters official academic records from this or any other institution is subject to similar disciplinary action.

ACADEMIC STANDING

To be in good academic standing, a student must maintain a cumulative grade point average equal to or higher than 2.0 based on all courses taken at Santa Clara and must have completed more than the minimum number of units, as specified below. Failure to meet these conditions may result in academic probation or disqualification from future registration at the University.

Probation

Students who have completed at least three quarters of academic work at Santa Clara or elsewhere are subject to academic probation if their cumulative grade point average is lower than 2.0 based on all courses taken at Santa Clara.

Students who have not yet completed three quarters of academic work at Santa Clara or elsewhere normally are not subject to academic probation as long as their cumulative grade point average is at least 1.6 based on all courses taken at Santa Clara.

Full-time students may also be subject to academic probation if they fail to make reasonable progress toward their degree. Thus, they are subject to academic probation if

1. they have not completed at least 36, 76, 115, or 160 quarter units by the end of their third, sixth, ninth, or 12th quarters of residency, respectively; or
2. they have completed fewer than 36 quarter units in the past three quarters of residency.

Disqualification

Students are subject to disqualification from further registration at the University if

1. they remain on probation for more than two consecutive quarters; or
2. their cumulative grade point average falls below 1.6; or
3. they complete fewer than 30, 64, 100, or 150 quarter units by the end of their third, sixth, ninth, or 12th quarters of residency, respectively.

Reinstatement

Reinstatement after disqualification from the University is rarely permitted, and then only on the recommendation of the dean of the School or College in which the student was enrolled. It also requires favorable action by the Committee on Admissions.

Requests for reinstatement should be addressed to the appropriate dean or director of academic advising and must include a description of any activities during the period of disqualification that would indicate that an improved academic performance can be expected in the future.

Note: Ordinarily, a student may not apply for reinstatement within a year of the date of disqualification. The application will be considered only if the student's academic deficiencies can be removed within a reasonable time.

Withdrawal

Students who wish to withdraw from the University during a quarter must complete a withdrawal form and an exit interview at the Student Resource Center. If the formal requirements for withdrawal are met, the student's registration will be canceled without academic penalty. A withdrawal notation (W) will be assigned for each course from which the student withdraws after the fourth week of the quarter. Students who leave the University during a quarter without formally withdrawing are subject to failing grades in all courses in which they were registered and are ineligible for refund of fees.

Any student leaving the University at the conclusion of any quarter also should complete the standard withdrawal process.

No withdrawal, either during or at the end of a quarter, will be considered complete unless the student has met all the financial obligations at the University. Students attending the University on deferred payment plans or with student loans must also clear their financial obligations with the Credit and Collection Office. Students who have unpaid University bills will not receive academic transcripts until their account has been settled.

Re-enrollment

Students who leave the University may return without filing a formal application for readmission if they meet *all* of the following conditions:

1. They left the University in good standing.
2. They plan to return to the same University School or College.
3. They are returning within five years.
4. They notify the Student Records Office in writing. If the notification is received in time, they may participate in advance registration.

Re-enrolling students who have attended another college or university are required to forward to the Student Records Office an official transcript of all work completed during their absence. Re-enrolling students may be subject to the curriculum requirements contained in the *Undergraduate Bulletin* in effect at the time of re-entry.

Retention

For the latest academic year, 3 percent of the full-time undergraduate students who enrolled for the fall quarter did not maintain their enrollment for the full academic year.

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University Religious, Social, and Cultural Life

CAMPUS MINISTRY

Campus Ministry functions as a leaven within the University community so that the Living God may be magnified in all people: students, staff, faculty, and alumni. In keeping with the Jesuit tradition of developing the person, and with the ideal that all of us be people for others, Campus Ministry seeks to facilitate growth in individuals and the community by its presence, programs, and services.

The Campus Ministry staff reflects the reality of the Church today: a team of men and women—lay, religious, and clergy—who encourage all members of this community to deepen their religious commitment in "the service of faith, of which the promotion of justice is an absolute requirement" (Decree 4, 32nd General Congregation of the Society of Jesus).

To attain this vision, Campus Ministry offers the University community a variety of programs: liturgies and other sacramental celebrations, retreats, counseling and spiritual direction, educational forums, interfaith sharing, and Bible studies. We collaborate with all segments of the community in the planning and execution of our programs.

In all of this, Campus Ministry is guided by the words of the prophet Micah: "This is what the Lord asks of you, only this: to act justly, to love tenderly, and to walk humbly with your God."

STUDENT LIFE

Participation in extracurricular activities is encouraged as part of the total development of the Santa Clara student. The primary educational objective in supporting student activities and organizations is to foster a community that is enriched by men and women of diverse backgrounds and wherein freedom of inquiry and expression enjoy high priority.

The following sections describe various aspects of student life and services. The *Student Handbook,* which may be obtained from the Office of the Vice President for Student Development, contains more detailed information.

Student Conduct Code

Through its Student Conduct Code, the University attempts to foster and preserve a community where respect for people and property is paramount. All stu-

dents are encouraged to pay special attention to the effect of their actions on others.

The president of Santa Clara University has delegated general supervision for matters of student conduct to the vice president for student development. Specific responsibility and authority for the University judicial system has been assigned to the dean of students. Student disciplinary cases are heard by the appropriate judicial board or by a judicial hearing officer. The dean of students determines which course of action is taken based on the nature of the case and the guidelines for judicial boards/councils found in the *Judicial System Handbook.*

The structure of the University judicial system consists of the following:

- Residence Life Judicial Board—resident students with jurisdiction over cases arising in or around residence halls or University apartments
- Student Life Judicial Board—resident and nonresident students with jurisdiction over cases arising on or about the campus other than residence halls or University apartments and at University-sponsored events in off-campus locations
- University Discipline Council—students, faculty, and staff hear cases of a serious nature, including cases that may result in separation from the University
- University Board of Appeals—students, faculty, and staff who hear appeals from the University Discipline Council

Final appeals from all judicial bodies or hearing officers are made to the vice president for student development acting on behalf of the president. In exceptional circumstances, the vice president for student development may suspend the normal structure of the University judicial system and appoint judicial hearing officers to conduct disciplinary hearings.

Student Housing

The University maintains residence halls and apartment complexes accommodating about 2,000 students. Each residence hall room is furnished with standard twin beds, desks, chairs, chests, and bookshelves. Residence halls have common bath facilities, and some student rooms have sinks. Most residence hall rooms are planned for double occupancy. The apartment complexes include one- and two-bedroom units furnished appropriately to the size and style of the apartment. Most of the residence halls are coeducational by floor or wing, with students sharing lounge areas, study rooms, television and recreation rooms, kitchens, coin-operated laundry facilities, and other common services.

Both professional and student staff live in campus housing and are committed to providing an atmosphere conducive to effective community living. The goal of the staff is to provide a living-learning environment that encourages academic achievement while assisting each individual student and the resident community in their development.

Students who wish to apply for accommodations in University housing should submit an application and contract with the required housing prepayment deposit

to the Office of Housing and Residence Life. New students submitting the required contract and prepayment deposit by the designated deadline are guaranteed accommodations in University housing. Transfer students are accommodated as space permits. If a housing reservation is canceled, the prepayment deposit will be forfeited in accordance with the refund schedule. Returning upperclass residents are assigned University housing in accordance with the housing room-selection and assignment process.

Requests for applications and other correspondence regarding student housing should be addressed to the Office of Housing and Residence Life.

Athletics

The University maintains a well-balanced program of intercollegiate, recreational, and intramural athletics.

Intercollegiate competition for men is conducted in basketball, baseball, tennis, water polo, golf, soccer, crew, and cross-country. Intercollegiate competition for women is conducted in volleyball, basketball, softball, tennis, cross-country, soccer, crew, and golf. All of the participants in these sports compete against opponents of recognized national standing.

The University is a member of the National Collegiate Athletic Association and the West Coast Conference.

The club sports program offers participation in men's boxing, volleyball, bowling, rugby, men's and women's lacrosse, and swimming.

Student Government

Associated Students is the official undergraduate voice of the student body. As such, its role and responsibility are to effectively represent students' needs, desires, and opinions by the active participation of student leaders in all areas of the University, including significant decisions that affect students and frequent interaction with student constituents.

Associated Students is divided into three main branches: executive, legislative, and judicial. The Executive Board, comprising six student leaders, constitutes the executive arm. Twenty-four elected senators make up the legislative area, and seven justices are responsible for administering and interpreting the rules and regulations governing Associated Students. The services area, another large part of the organization, oversees the operation of a student convenience store, a student rental operation, free legal consulting, and a book exchange program. ASSCU also supports clubs and class programming efforts for the enjoyment of the entire campus.

Student Media

KSCU-FM Radio KSCU-FM is managed and operated by Santa Clara students. It is designed to train students in broadcasting skills and to provide the University community with music, news, sports, and public service information.

The Santa Clara Review *The Santa Clara Review,* founded in 1869, is the University's literary magazine and the oldest college publication in the West. It invites authors from every academic area to present their works for publication. Published three times a year, the magazine includes essays, journalistic pieces, short stories, poetry, and reviews.

The Redwood Having recently published its 88th edition, *The Redwood,* the University's student-produced yearbook, continues to record the annual story of the University. Throughout the years, *The Redwood* has earned a reputation for trendsetting and creativity in text, photography, layout, and graphic design.

The Santa Clara As the weekly campus newspaper, *The Santa Clara* reports on current events, sports, entertainment, and people. Outstanding coverage and design recently earned *The Santa Clara* an award that placed it in the top sixth of the country's university papers. All undergraduate and graduate students are welcome to join the staff of nearly 75 students who work in reporting, photography, graphic design, typesetting, advertising, and layout.

Student Organizations

Santa Clara Community Action Program The Santa Clara Community Action Program (SCCAP) is a student volunteer organization founded in 1966. The volunteer opportunities that it offers in schools, hospitals, special educational centers, and the local jail system provide experiences in education, law, medicine, psychology, religious studies, and sociology. This exposure is not only useful in making wise career decisions, but also important in the sharing of moral values.

Students Programming Alternative Campus Events Students Programming Alternative Campus Events (SPACE) provides special alternative programs in recreation, fine arts and performing arts, noncredit courses, and leisure pastimes for students, faculty, and staff.

Multicultural Center Program Board The Multicultural Center Program Board sponsors events and activities that promote diversity on the campus and reflect the University's commitment to enhancing awareness and understanding of cultural pluralism.

Fraternities and Sororities Santa Clara University has four national fraternities (Sigma Alpha Epsilon, Sigma Pi, Theta Chi, and Pi Kappa Alpha); three national sororities (Alpha Chi Omega, Alpha Phi, and Delta Gamma); InterGreek Council; and Order of Omega, a national honorary society for outstanding fraternity and sorority members.

Debate Santa Clara has traditionally had one of the strongest intercollegiate debate teams in the western United States. The team participates in approximately 10 tournaments annually, including several out-of-state invitationals. The program is open to participation by all students, and some scholarships are available to those with previous experience in national contests. For information regarding these scholarships, contact the Financial Aid Office.

Honor Societies Santa Clara University honor societies are listed on Pages 254–258.

Student Clubs

Students can become involved in a number of the more than 80 academic, recreational, religious, social, ethnic, and political organizations active on campus.

STUDENT RESOURCES AND SERVICES

Listed below are the many service centers established to meet the needs of students. Each center provides a variety of programs to encourage personal growth.

Career Services

Career Services provides a variety of services to assist students in clarifying, planning, and achieving their career goals.

A professional staff of counselors offers career counseling to individuals and groups. Workshops are held regularly on career planning, which includes self-assessment, resume writing, interviewing, and job search strategies. Programs have been developed that bring professionals from various fields to present information about career opportunities. A special program of informational interviewing links students with alumni in a variety of fields.

Career Services maintains strong contacts with employers. Information on internships and cooperative education is available, as well as listings of full-time, part-time, summer, temporary, and work-study jobs. More than 200 local, national, and international employers recruit on campus to fill employment needs. Career fairs also attract many employers to the campus. The center maintains an extensive file with names of contacts at employer organizations.

Counseling Center

The Counseling Center, located on the second floor of Benson Memorial Center, offers free professional counseling to all undergraduate and graduate students. Confidential psychological counseling in a supportive atmosphere is designed to help students develop greater self-understanding and become more personally effective. Some of the concerns that students discuss with counselors include stress, depression, sexuality, individual identity and family, friendship, and love relationships. The special issues of minority and international students are recognized. In addition to individual, couples, and family counseling, small groups and workshops on topics of general interest are frequently offered. Consultation and referral for faculty, staff, and alumni and training opportunities for graduate students in counseling are also available.

Students in crisis or with urgent needs can be seen immediately on a walk-in basis. Regular appointments are made through the receptionist, and clients can be seen within one week by calling 408-554-4172. Counseling hours are Monday through Friday, 8 a.m. to 5 p.m., and some evenings by appointment.

Center for Student Leadership

In the Jesuit tradition of responsibility for excellence, the Center for Student Leadership is committed to the development of socially responsible leaders. The center has designed a comprehensive leadership education program that is dedicated to preparing students to assume leadership roles in the modern world.

The Center for Student Leadership is located in the basement of Benson Memorial Center and assists students in maximizing their educational, cultural, social, and service opportunities outside the classroom. The center staff advise Associated Students of Santa Clara University (ASSCU), Santa Clara Community Action Program (SCCAP), Multicultural Center Program Board, Students Programming Alternative Campus Events (SPACE), Social Presentations, the student media, clubs and organizations, and fraternities and sororities. Students interested in joining a student organization or forming a new club or organization are encouraged to come by the Center for Student Leadership for more information.

Student Health Services

Student Health Services are located in the Cowell Center on campus. Students may see the Student Health Services medical staff by appointment or for drop-in services while the University is in session. Students may call the Health Center (408-554-4501) for a schedule of hours.

All full-time undergraduate students and full-time law students are eligible for medical care at the center at no charge as health service fees are part of their regular University fees. Graduate students and part-time undergraduate students, on payment of the health service fee, are also eligible for medical care at the center. Health insurance coverage for outside care or other special needs is available and required for all international and full-time undergraduate students. University health insurance charges may be waived upon proof of outside coverage.

All students eligible for and those who elect to pay for Student Health Services are required to have a pre-entrance health examination. Additional information about health insurance coverage and pre-entrance examinations may be obtained from Student Health Services.

Student Resource Center

The main focus of the Student Resource Center is to reach out to students, academic departments, and other student development departments in order to build bridges to increase the academic success and full participation of all populations within the University community. Resource areas within the center include

African American Student Resources
Asian American Student Resources
Chicano/Latino Student Resources
Commuter Student Resources
Disabled Student Resources
International Student Resources
Re-entry Student Resources
Women Student Resources

Services and activities supported by the Student Resource Center include

- enhancing students' academic success and social involvement and progress;
- assisting students in effectively expressing their needs and concerns;
- creating opportunities for students' personal growth, responsibility for actions, and motivation and leadership development;
- providing opportunities for learning about the values and beliefs of one's own group and of other groups; and
- providing necessary academic support services and accommodations for students with disabilities.

Community Outreach programs provide Santa Clara students an opportunity to work with students from diverse backgrounds and generate positive community interaction. **Project 50**, a special summer program, encourages local eighth-graders to complete high school and pursue a college education. The **CIT Program** is an added component for Project 50 students who excel and are potentially college-bound.

Teaching and Learning Center

The Teaching and Learning Center, located in 247 Bannan Hall, offers a variety of programs to help students improve their learning skills and prepare for further education.

Two tutorial programs provide undergraduate students with assistance in many classes. Through the Individual Tutorial Program, students may arrange for personal tutoring. Drop-in tutoring is also available at different campus locations. Training in study skills takes place through workshops or in individual sessions at the center. Students receive help with time management, reading, and note taking and learn how to prepare for and improve performance on exams.

The center, by providing learning asssitance in a supportive and encouraging environment, is especially useful to international graduate students who require special help in English.

The Teaching and Learning Center also assists juniors, seniors, and graduate students planning to pursue graduate or professional studies select a school and secure financial aid. The center maintains a drop-in library of more than 800 graduate school catalogs and reference sources and arranges campus interviews with graduate school representatives from California and out-of-state schools. Each year the center sponsors a combined Graduate/Career Information Day with Career Services.

For national and international competitions for scholarships in which candidates must be officially nominated or endorsed by the University, the associate director, together with several members of the faculty, selects the nominees and arranges the endorsements. This office does not award fellowships, scholarships, or other financial assistance for study at Santa Clara or elsewhere.

The center also offers support for faculty through professional development programs such as workshops on teaching and learning and confidential individual evaluations of teaching.

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Facilities

ADOBE LODGE

Adobe Lodge is the oldest building on campus. Restored in 1981 to its 1822 decor, the Lodge contains a presidential dining room as well as central and private dining facilities for faculty and staff.

BENSON MEMORIAL CENTER

The Robert F. Benson Memorial Center is the hub of campus life. The Benson Center is designed to meet the various needs of students, faculty, staff, alumni, and guests and to provide an environment for the education of the whole person that continues outside the classroom. Among the many services and facilities available are the Information Desk; Game Room; Brass Rail Cafe; Benson Cafeteria; Bronco Corral; Shapell Lounge; Down Under, a student-operated convenience grocery store; meeting rooms; Mission City Federal Credit Union; the bookstore; and post office. In addition, the offices of Campus Ministry, a number of offices of the Division of Student Development, and offices of student government and organizations are housed in the center.

CLASSROOM BUILDINGS

Nine classroom buildings house not only some 72 classrooms but also numerous administrative offices. Mayer Theatre and three Fine Arts buildings provide special classroom, rehearsal, and performance facilities.

COMPUTING FACILITIES

Santa Clara provides mainframe and personal computing facilities to support educational programs. Free noncredit short courses for both types of computers are offered periodically. Computer labs are typically open from 8 a.m. to midnight Monday through Friday, with hours slightly reduced on weekends.

The principal academic mainframe system is a Digital Equipment Corporation VAX-6610 running under the VMS operating system. The system operates 24 hours per day, and students have access from three public laboratories and through 30 dial-up ports.

PCs are concentrated in two general-purpose laboratories containing 150 IBM machines and various software packages for word processing, spreadsheet and database applications, and programming. Each PC can also function as a termi-

nal to the VAX. An additional 60 machines are contained in the Business School PC Classroom, Engineering PC CAD Lab, and in three smaller clusters serving the Chemistry, Mathematics, and Physics departments.

All registered students may use the PC labs and the central VAX without additional charge. More than 80 percent of the full-time faculty have a personal computer or workstation in their office, and computer use is a common element in all disciplines.

The School of Engineering provides an advanced graphics workstation facility containing 50 Hewlett-Packard 9000 workstation computer systems with high-resolution color displays. These machines are located in two classroom facilities (20 systems each) and five engineering laboratories, and are used for computer-aided design (CAD), computer graphics, and software development by the five engineering disciplines. In addition, the School of Engineering has several 386 PCs and SUN workstations.

Most of the academic computers are connected by an Ethernet local area network (LAN), which provides high-speed communications among the various systems. Santa Clara is also a node on the Internet and BITNET wide-area networks, providing students and faculty with electronic mail, file transfer, and remote access communications to more than 3,000 nodes in the United States, Canada, Europe, Japan, and other countries throughout the world.

COWELL HEALTH CENTER

Cowell Health Center offers health services to students (see Page 277). The Cowell Center also houses the Public Safety Office and the University Human Resource Management Department.

DE SAISSET MUSEUM

The de Saisset Museum includes American, European, African, and Oriental art, as well as historically important objects from the early days of Mission Santa Clara. In addition to its permanent collection, it features special exhibitions of traditional, modern, and contemporary art.

Museum hours are Tuesday through Sunday, 11 a.m. to 4 p.m.; closed Mondays and holidays.

KIDS ON CAMPUS

Kids on Campus is the University child-care and preschool center for children of students, faculty, and staff members. The center is a cooperative under the supervision of a volunteer committee of parents with a small staff of paid employees and parent and student volunteers. It also used occasionally for practicum experiences by students in psychology and education courses. The preschoolers benefit from a carefully developed program designed to meet their interests and to prepare them for kingdergarten. Students are encouraged to visit the Kids on Campus facilities on the east side of the campus.

LEAVEY ACTIVITIES CENTER

Leavey Activities Center is a widely used extracurricular facility at Santa Clara. Since the construction of this approximately two acres of recreational space, the intramural and recreation programs have achieved 80 percent student participation and maintained a high level of interest in competition, recreation, and social activity.

Included in the center is the Toso Pavilion for basketball, as well as racquetball courts, a volleyball area, swimming pool, men's and women's locker rooms, weight training section, sauna, and steam rooms. With such facilities and activities, the Leavey Activities Center has fulfilled its design for use by students, faculty, and staff of the University. It also continues to serve as a setting for cultural and social events.

A monthly schedule of hours and activities is posted on the Leavey bulletin board. Students must present validated ID cards to an attendant upon entering.

LOUIS B. MAYER THEATRE

The 500-seat Louis B. Mayer Theatre is designed to provide the traditional proscenium stage common to most theatres, as well as an orchestra pit and thrust elevators that can be raised or lowered electrically. In a remarkably simple procedure, a wall is moved, a few seats are relocated, and the main theatre is reoriented to a new dramatic form that extends the stage into the auditorium so that the audience surrounds the action on three sides.

Mayer Theatre also has a special floor constructed for dance, as well as a large movie screen and film projector.

The Fess Parker Studio Theatre, housed within the Mayer Theatre complex, has no fixed stage or seating. Its black-box design, complete with movable catwalks, provides superb flexibility in an experimental setting.

MISSION SANTA CLARA

Mission Church marks the historic heart of the University. Adjacent to the beautiful Mission Gardens, the Church holds regular liturgical and sacramental services and provides an open place for quiet reflection and prayer.

NOBILI HALL

Nobili Hall provides on-campus housing for the University's Jesuit community. The four-story facility, named for John Nobili, first president of the college, contains a dining area and a chapel.

MICHEL ORRADRE LIBRARY

The collections and services of the Michel Orradre Library are designed to support the University's undergraduate and graduate academic programs.

OSCAR, the library's online catalog, was introduced during the 1991–92 ac-

ademic year. This is only one of a number of computerized services that provide access to resources in Santa Clara's collections or through various forms of document delivery.

Orradre Library's collection, which dates from the founding of Mission Santa Clara, now contains more than 567,000 volumes and more than 511,000 microforms. The library currently receives more than 5,300 serial subscriptions and is a depository for U.S. and California government documents, which number more than 343,000 publications.

Staff at the reference and documents desks are prepared to help with research problems and assist students in using the library's collections and services; helpful publications and guides are always available. The Reference Department provides CD-ROM and online database search services, and the Circulation and Periodicals/Microforms departments assist with access to and borrowing of materials.

The library has open reading areas, individual carrels, small-group study rooms, copy facilities, and a personal computer laboratory.

During the academic year, the library is open seven days a week for a total of 106 hours. Most books circulate to undergraduates for 21 days and to graduate students for 42 days, but loan periods for heavily used materials on course reserve are limited to two hours or one, three, or seven days.

The Science Resource Center, located in the Daly Science Center, provides a noncirculating reference collection and course reserve services for biology, chemistry, and physics.

RICARD MEMORIAL OBSERVATORY

Named after Jerome S. Ricard, S.J., Santa Clara's Padre of the Rains who was most famous for his sunspot theory of weather forecasting, the observatory now houses all of the University's audiovisual equipment and Media Services. Media Services offers downlink capabilities affording the University community the opportunity to participate in satellite broadcasts and teleconferences.

BUCK SHAW STADIUM

Built in 1962 for Santa Clara's varsity baseball and soccer programs, the 10,000-seat stadium and surrounding practice fields are the outdoor facilities for Santa Clara's highly successful intercollegiate and intramural athletic programs.

STUDENT HOUSING

The student residence halls, described on Pages 273–274, offer students a variety of choices in University housing. Facilities include study and recreational areas in addition to student sleeping rooms and service areas.

Accreditations and Memberships

ONE HUNDRED AND FORTY-THIRD YEAR
1993–94

Accredited by the Accrediting Commission for Senior Colleges and Universities of the Western Association of Schools and Colleges

Accredited by the American Assembly of Collegiate Schools of Business (Undergraduate and Graduate Programs)

Accredited by the American Bar Association

Admitted to Membership in the Association of American Law Schools

Accredited by the State Bar of California

Accredited by the Accreditation Board for Engineering and Technology (Undergraduate Civil, Computer, Electrical, and Mechanical Engineering)

Accredited by the California State Commission on Teacher Credentialing

Accredited by the American Chemical Society

Admitted to Membership in the National Association of Schools of Music

Admitted to Membership in the National Association of Schools of Theatre

Accredited by the American Association of Museums

Member of the American Council on Education

Member of the Council of Graduate Schools in the United States

Member of the American Council of Learned Societies

Member of the Association of Jesuit Colleges and Universities

Member of the Conference of Western Law Schools

Member of the College Entrance Examination Board

Member of the Association of American Colleges

Member of the Association of Independent California Colleges and Universities

Member of the Council for Advancement and Support of Education

Institutional Member of the American Mathematical Society

Academic Member of the Mathematical Association of America

Member of the Western Association of Graduate Schools

Member of the Law School Admission Council

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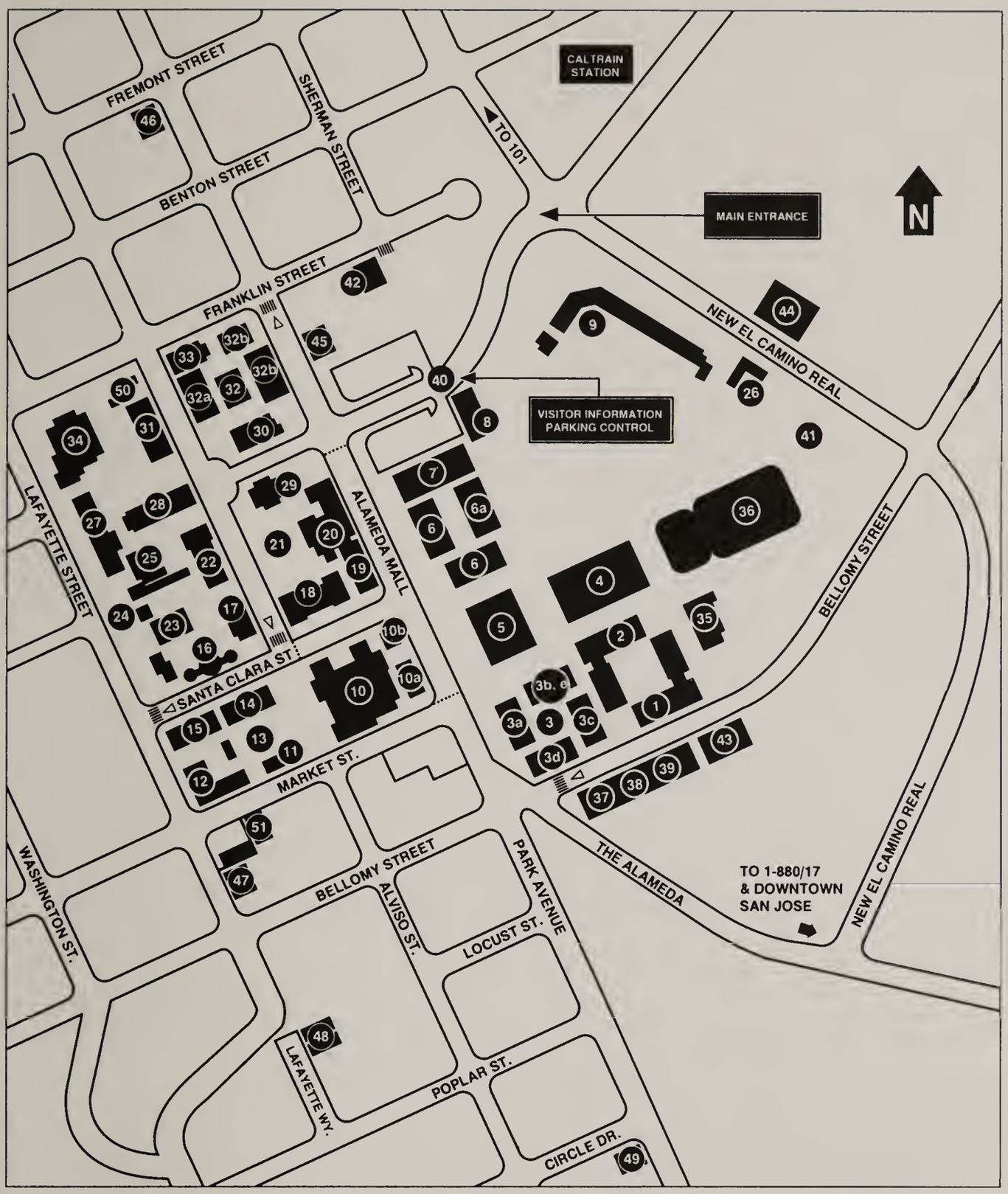
1. Sanfilippo Residence Hall
2. Campisi Residence Hall
3. Graham Residence Center
    - 3a. Strub Hall
    - 3b. Swig Hall
    - 3c. Hancock Hall
    - 3d. O'Neill Hall
    - 3e. Multicultural Center
4. Campus Tennis Courts
5. Orradre Library
6. Sullivan Engineering Center
    - 6a. Thomas J. Bannan Building
7. Bannan Hall Classroom Building
8. Field House
9. Buck Shaw Stadium
10. Benson Memorial Center
    - 10a. Campus Bookstore
    - 10b. Shapell Lounge
11. Swig Residence Hall
12. Dunne Residence Hall
13. Kennedy Mall
14. McLaughlin Residence Hall
15. Walsh Residence Hall
16. Ricard Memorial Observatory
17. Donohoe Alumni House
18. Kenna Hall – Leavey School of Business and Administration
19. Bergin Hall – School of Law
20. Heafey Law Library
21. Staff Lounge
22. St. Joseph's Hall
23. Varsi Hall – Admissions and Development Offices
24. Restrooms
25. Adobe Lodge – Faculty Club
26. University Day Care Center
27. Nobili Hall – Jesuit Residence
28. Mission Santa Clara
29. Walsh Administration Building
30. De Saisset Museum
31. O'Connor Hall
32. Daly Science Center – Science Library
    - 32a. Physics
    - 32b. Chemistry
33. Alumni Science Hall
34. Mayer Theatre
35. Cowell Health Center/Public Safety/Human Resource Management
36. Leavey Activities Center
37. Fine Arts Building
38. Dance Building



39. Music Building
40. Main Gates
41. Alumni Park
42. Law House
43. Casa Italiana
44. Physical Plant/Central Mailing/Central Receiving/Purchasing
45. Law Clinic
46. Alameda Hall
47. 569 Lafayette Apartments
48. Lafayette Apartments
49. Villa Apartments
50. Ramos Center
51. Eastside Project

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Director, Student Services and Financial Services:
Richard J. Toomey
408-554-4505

Religious Services

Campus Ministry
Director, Campus Ministry:
Maureen Schaukowitch, OSF
408-554-4372

Student Services

Student Activities and Services
Vice President for Student Development:
James I. Briggs
408-554-4583

Career Counseling and Student Employment
Director, Career Services:
Carolyn J. Hennings
408-554-4421

University Services

Alumni Affairs
Executive Director, Alumni Relations:
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Assistant Vice President for University Communications:
Paul J. Hennessy
408-554-4545

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University Librarian:
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Collect of Arts and Sciences, Undergraduate Program
Dean: Peter A. Facione
408-554-4455

Division of Counseling Psychology and Education
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School of Law, J.D. Degree Program
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